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NAS PENSACOLA
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DRAFT CONTAMINATION ASSESSMENT PLAN FOR TANKS 681 AND 682 WITH TRANSMITTAL LETTER NAS PENSACOLA FL

4/30/1999

TETRA TECH INC

Contamination Assessment Plan for Tanks 681 & 682

Naval Air Station Pensacola
Pensacola, Florida

Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order CTO-0086

APRIL 1999

TETRA TECH NUS, INC.
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TTNUS/TAL-99-0098-01

April 30, 1999

Project Number 0231

Commanding Officer
Department of the Navy
SOUTHNAVFACENGCOM
ATTN: Byas Glover (Code18410)
2155 Eagle Drive
North Charleston, South Carolina 29418-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0231

Subject: Draft CAP and HASP for UST 0014 Tanks 681/682 at Naval Air Station Pensacola, Pensacola, Florida

Dear Mr. Glover,

On behalf of the U.S. Navy SOUTHNAVFACEGCOM, TTNUS is submitting the Draft CAP and HASP for UST 0014 Tanks 681/682 for the above referenced facility.

The Final document will be issued after comments are addressed.

Please call me at (850) 656- 5458 with any questions.

Very Truly Yours,

Terry Hansen, P.G.
Task Order Manager

TH/kd

c: Mr. Byas Glover, SDIV (1 copy)
Mr. Ron Joyner, NAS Pensacola (1 copy)
Mr. Mark Perry /File Tetra Tech NUS, Inc. (1 copy)
Ms. Debbie Wroblewski / DER Tetra Tech NUS, Inc. (w/o enclosures)

CONTAMINATION ASSESSMENT PLAN
TANKS 681 & 682

U.S. NAVAL AIR STATION
PENSACOLA, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:

Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:

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Foster Plaza
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CONTRACT NO. N62467-94-D-0888
CONTRACT TASK ORDER 0098

April 1999

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FOREWORD

Subtitle I of the Hazardous and Solid Waste Amendments (HSWA) of 1984 to the Solid Waste Disposal Act (SWDA) of 1965 established a national regulatory program for managing underground storage tanks (USTs) containing hazardous materials, especially petroleum products. Hazardous wastes stored in USTs were already regulated under the Resource Conservation and Recovery Act (RCRA) of 1976. Subtitle I requires that the U.S. Environmental Protection Agency (USEPA) promulgate UST regulations. The program was designed for administration by the individual States, who were allowed to develop more stringent standards, but not less stringent standards. Local governments were permitted to establish regulatory programs and standards that are more stringent, but not less stringent than either State or Federal regulations. The USEPA UST regulations are found in the Code of Federal Regulations, Title 40, Part 280 (40 CFR 280) (*Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks*) and Title 40 CFR 281 (*Approval of State Underground Storage Tank Programs*). Title 40 CFR 280 was revised and published on September 23, 1988, and became effective December 22, 1988.

The Navy's UST program policy is to comply with all Federal, State, and local regulations pertaining to USTs. This report was prepared to satisfy the requirements of Chapter 62-770, Florida Administrative Code regulations on petroleum contamination in Florida's environment as a result of spills or leaking tanks or piping.

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GLOSSARY

ASTM	American Society for Testing and Materials
bls	below land surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CA	Contamination Assessment
CAP	Contamination Assessment Plan
COC	chemical of concern
COMPQAP	Comprehensive Quality Assurance Plan
CTO	Contract Task Order
DO	Dissolved Oxygen
DPT	direct push technology
DRO	Diesel Range Organics
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection (formerly FDER)
FDER	Florida Department of Environmental Regulation
FID	flame ionization detector
FOL	field operations leader
GPS	Global Positioning System
HASP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments of 1984
ID	inside diameter
IDW	investigative-derived waste
JSA	Jim Stidham and Associates, Inc.
MOP	monitoring only plan
msl	mean sea level
NAS	Naval Air Station
NFA	no further action
NGVD	national geodetic vertical datum
NTU	Nephelometric Turbidity Unit
OVA	organic vapor analyzer
PID	photo ionization detector
POC	Point of Contact
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control

GLOSSARY

RCRA	Resource Conservation and Recovery Act
Redox	oxidation-reduction potential
SAR	Site Assessment Report
SOP	standard operating procedure
SOUTHDIVNAVFAC-ENGCOM	Southern Division, Naval Facilities Engineering Command
SWDA	Solid Waste Disposal Act of 1965
TtNUS	Tetra Tech NUS, Inc.
USEPA	U.S. Environmental Protection Agency
USTs	underground storage tanks

1.0 INTRODUCTION

Tetra Tech NUS, Inc. (TtNUS), was contracted by Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) to prepare a Contamination Assessment Plan (CAP) for Tanks 681 and 682 at Naval Air Station (NAS) Pensacola, Florida. The CAP outlines field investigations and sampling programs that will assess the source(s) of petroleum contamination in the vicinity of the Tanks and evaluate the horizontal and vertical extent of petroleum contamination detected. The following report identifies the site location and develops a rationale for the proposed field investigations to be implemented under this contamination assessment (CA).

1.1 PURPOSE OF THE CAP

The CAP serves as a guide for the preliminary site characterization activities to be conducted at Sites 100 and 102. This plan documents the procedures for field activities and sample analyses. The CAP specifies sampling protocol and procedures for data collection and sample analysis, sample locations, sample handling and analysis, sampling equipment, and handling of investigative derived wastes (IDW). This plan was prepared in accordance with the TtNUS Quality Assurance Program Manual, dated October 1, 1998.

1.2 CONTAMINATION ASSESSMENT PLAN ORGANIZATION

The CAP is organized into six chapters (Chapters 1.0 to 6.0). Chapter 1.0 presents the purpose and organization of the CAP. Chapter 2.0 summarizes the site description, history, and geologic characteristics. Chapter 3.0 presents information on the potable water wells at NAS Pensacola. Chapter 4.0 identifies the investigative methodology for conducting the assessment. Chapter 5.0 addresses the handling of IDW resulting from investigation activities. Chapter 6.0 identifies the sampling and analysis schedule of operations for the site assessment activities. Supporting data are provided in the Appendices.

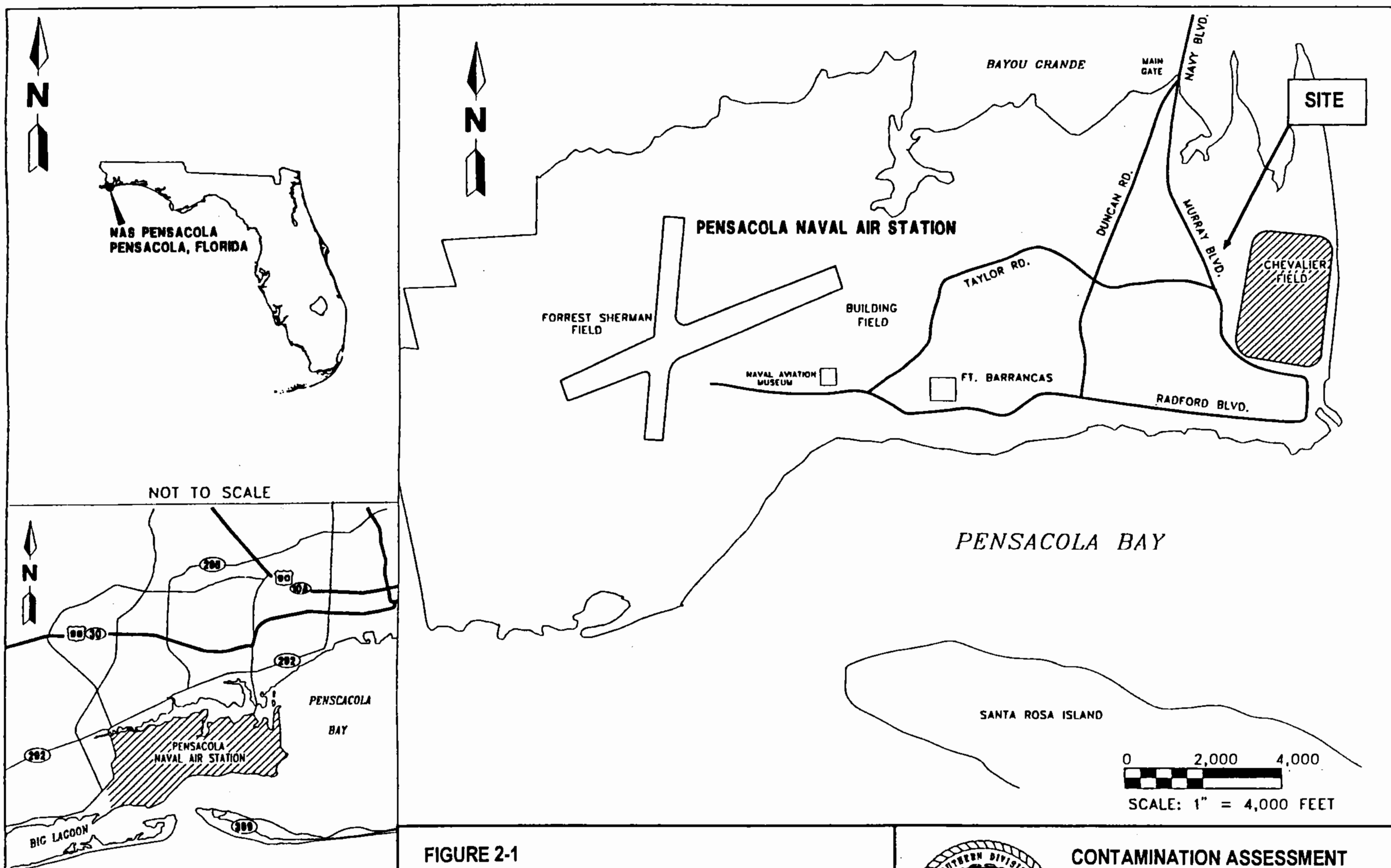
2.0 BACKGROUND

2.1 SITE DESCRIPTION

NAS Pensacola is located in Northwest Florida on the west edge of Pensacola Bay, 2 miles south of Pensacola, Florida, on Navy Boulevard (Figure 2-1). The site is a 1.5 acre fenced in fuel farm consisting of two abandoned in place cut and cover storage tanks (Tanks 681 & 682) with capacities of 1.102 million gallons each and associated pump houses and underground distribution piping (Figure 2-2). The tanks were installed in December 1943 to store diesel fuel marine, however, Bunker C, and Aviation Gasoline were periodically stored in the tanks. Each tank is 102.5 feet in diameter and 21 feet in depth. The Bunker C contents were kept fluid by a steam line which approaches the site from the east. The site is bordered to the north by a paved road, to the south by a power substation, to the west by a water tower, and to the east by a surface water runoff ditch.

2.2 SITE HISTORY

In April 1995, Jim Stidham and Associates, Inc. (JSA) performed a closure assessment at the site. Petroleum constituents were detected in a groundwater sample in excess of Florida Department of Environmental Regulation (FDER), presently the Florida Department of Environmental Protection (FDEP), groundwater standards. In July 1995, a release of an unknown quantity of petroleum constituents was reported to the FDEP based on the detection of these petroleum constituents (Appendix A).

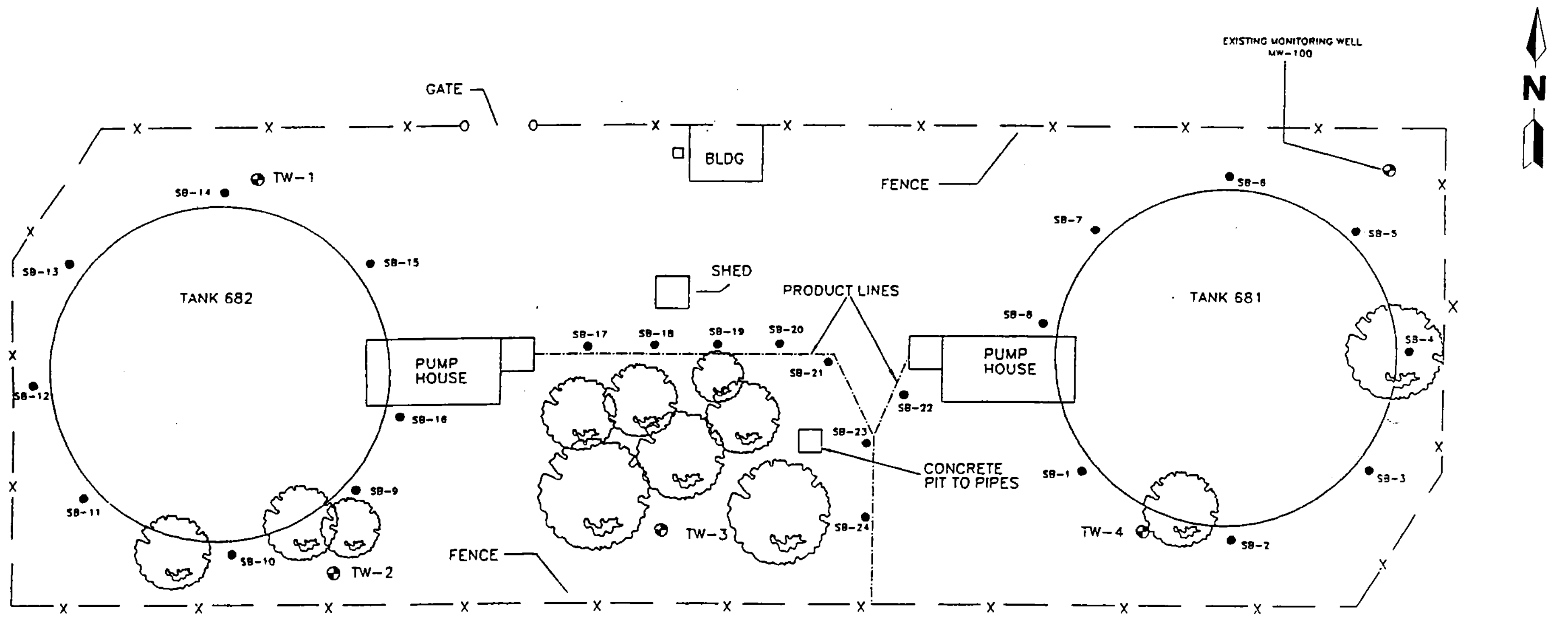


H:/PENSCOLA/BASELOC/KGP-NP/08-18-95

FIGURE 2-1
SITE LOCATION MAP
SOURCE: ABB-ES, 1994

CONTAMINATION ASSESSMENT PLAN
TANKS 681 & 682

NAS PENSACOLA
PENSACOLA, FLORIDA



DRAWN BY	DATE
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE 1" = 50'	

SITE MAP
SOURCE: JSA, 1995
TANKS 681 & 682
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NO.	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 2-2	REV. 0

3.0 INVENTORY OF PROXIMATE POTABLE WATER WELLS

Three water wells at NAS Pensacola provide emergency backup potable water supply to the station. These well have typically been used as fire fighting water supply sources. One of the potable water supply wells has been abandoned. The remaining two potable supply wells located at NAS Pensacola, designated as Well No. 1 and Well No 2, are indicated on Figure 3-1. According to NAS personnel, these wells are not currently used for potable water supplies at NAS Pensacola, but are available as reserve potable water supplies should the need arise. Potable well inventory data are presented in Table 3-1. Both wells at NAS Pensacola are screened in the main producing zone of the sand-and-gravel aquifer at depths ranging from 105 to 160 feet below land surface (bls). The main source of water for the base is a Navy-owned well field located at the Naval Technical Training Center, Corry Station. The water from this well field is pumped from the Sand and Gravel Aquifer. A potable well survey will be conducted to supplement this potable well data (ABB-ES, 1995) during the site investigation to assess the risk of contami nation to potable water sources.

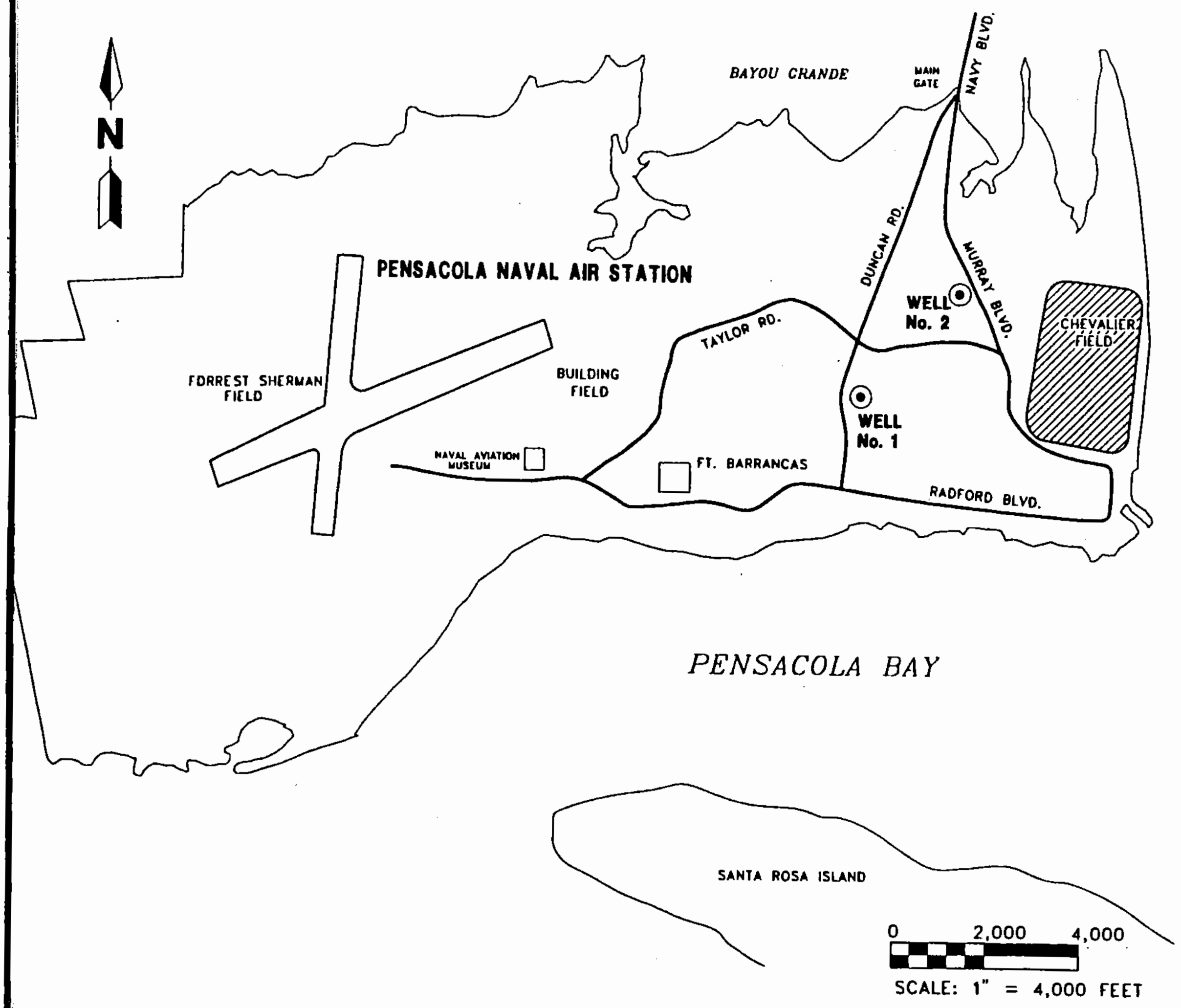
Table 3-1

Potable Well Inventory Data

Contamination Assessment Plan
Tanks 681 & 682
NAS Pensacola, Florida

Well Identification Number/Local Name	Location	Total Depth (feet bls)	Screened Interval (feet bls)	Diameter Casing/Screen (inches)
302116087170201/No. 1	Sec. 1,T3S,R30W Duncan and Taylor Roads	174	105-160	24/12
302124087163601/No. 2	Sec. 1,T3S,R30W Murray and Farrar Roads	178	110-160	24/12

Note: bls = below land surface.



DRAWN BY DATE	POTABLE WELL SURVEY SOURCE: ABB-ES, 1994 TANKS 681 & 682 NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NO.
CHECKED BY DATE		APPROVED BY DATE
COST/SCHED-AREA		APPROVED BY DATE
SCALE AS NOTED		DRAWING NO. FIGURE 3-1 — REV. 0

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

4.0 PROPOSED ASSESSMENT PLAN

4.1 CONTAMINATION ASSESSMENT ACTIVITIES

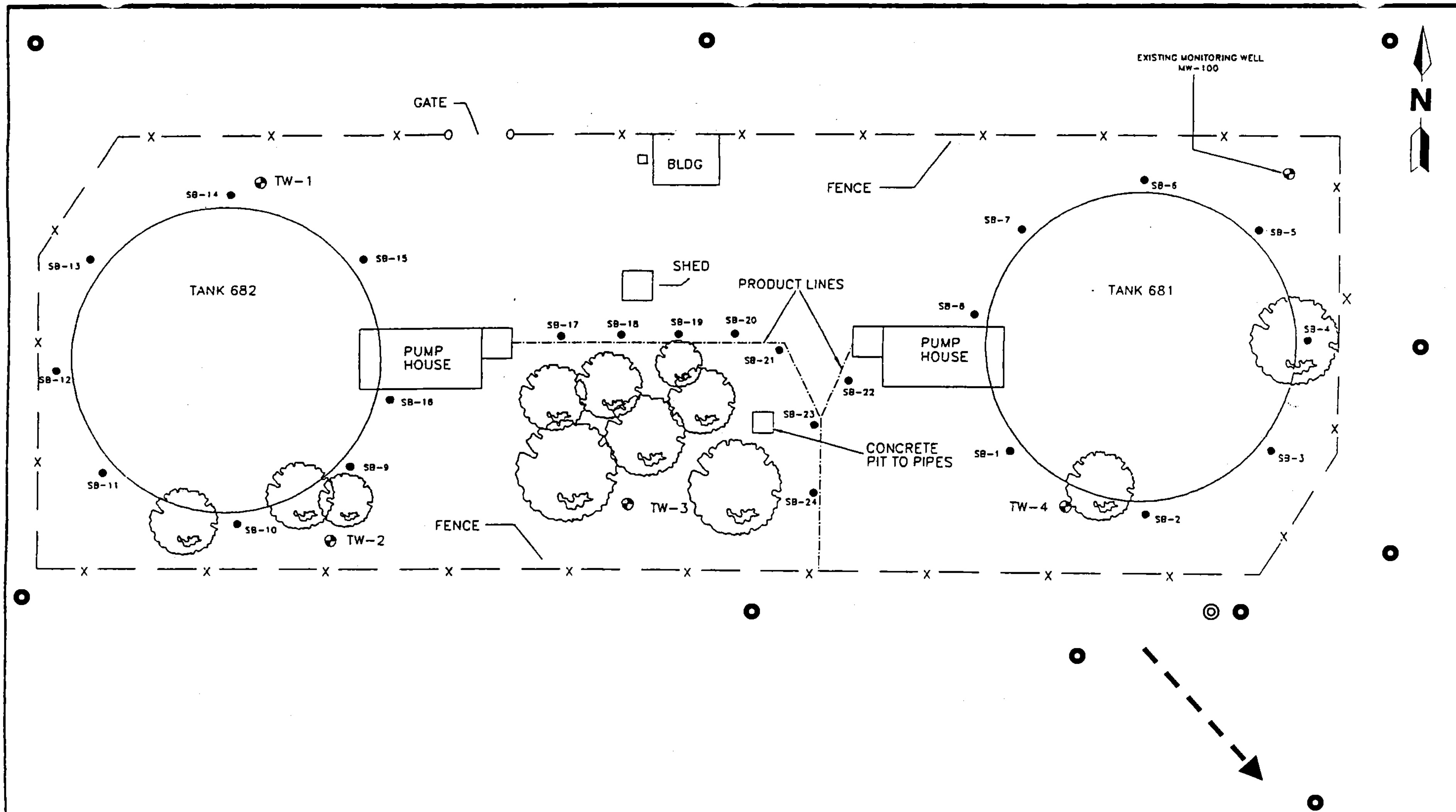
The contamination assessment investigation for Tanks 681 & 682 will include a startup meeting to be held at the site. All personnel associated with the investigation will review the scope of work presented in the CAP and the Health and Safety Plan (HASP). During this same time, TtNUS will secure the necessary excavation and/or archeological permits, and acquire utility clearance for boring and monitoring well installation at the site. Scheduling, logistics, and special precautions will also be discussed at this time. The purpose of the investigation is to identify the vertical and horizontal extent of petroleum hydrocarbon constituents in the soil and groundwater associated with Tanks 681 & 682. The CA will require the advancement of soil borings, the installation of groundwater monitoring wells, the collection and screening of soil samples, and the collection and laboratory analyses of soil and groundwater samples from site borings and monitoring wells (Figure 4-1). The following sections provide an overview of the proposed investigation activities.

4.1.1 Soil Investigation

Approximately 10 soil borings will be advanced to the water table (approximately 10 feet bls in areas away from the tank mounds) around Tank 681 and 682 to delineate areas of hydroccarbon constituents detected in the soil during the Tank Closure Assessment (JSA, 1995). Soil borings will be advanced using either a GeoProbe or a manually operated auger. Soil samples will be collected at 2-foot intervals until the water table is reached and screened for petroleum vapors using both an organic vapor analyzer (OVA) equipped with a flame ionization detector (FID). Select soil samples will be retained for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX) and diesel range organics (DRO) using a mobile laboratory.

The soil OVA readings will be used to target the collection of three soil samples for off-site analysis for petroleum constituents by an FDEP approved contract laboratory. Samples for off-site analysis will be collected from the vadose zone samples at locations of high, intermediate, and low ova readings. The soil samples will be analyzed for parameters as identified in Chapter 62-770, F.A.C. Additionally, soil samples will be collected for analysis of SPLP as needed.

Concurrent with the soil investigation, groundwater samples will be collected from each borehole. The groundwater samples will be screened for BTEX and DRO constituents using the mobile laboratory. The



NOTE

- ⦿ PROPOSED SHALLOW SOIL BORING AND MONITORING WELL LOCATION
- ◎ PROPOSED DEEP MONITORING WELL
- ➔ ASSUMED GROUND WATER FLOW

DRAWN BY DATE		PROPOSED SOIL BORINGS AND MONITORING WELLS TANKS 681 & 682 NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NO.	
CHECKED BY DATE	DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND		APPROVED BY DATE	
COST/SCHED-AREA			APPROVED BY DATE	
SCALE 1" = 50'			DRAWING NO. FIGURE 4-1	REV. 0

groundwater data collected from each boring will be used to evaluate areas of possible groundwater contamination and aid in the placement of monitoring wells.

4.1.2 Groundwater Investigation

Approximately 10 shallow direct-push monitoring wells (up to 20 feet in depth) and 1 deep well (up to 35 feet in depth) will be installed at the site. Monitoring well locations will be proposed by TtNUS and approved by the FDEP prior to installation. After the monitoring wells have been installed and developed, groundwater samples will be collected from all monitoring wells that do not contain free product and submitted to an FDEP approved contract laboratory for analysis of gasoline and kerosene analytical group parameters as presented in Chapter 62-770, F.A.C. A specific capacity test will be performed at one monitoring well and compared to other hydraulic conductivity tests at NAS Pensacola to assess the hydraulic conductivity of the aquifer.

4.1.3 Investigative Derived Waste

Investigation-derived water will be containerized and segregated in the following categories:

- Decontamination fluids;
- Development; and
- Purge water from wells.

IDW from the soil sampling will be returned to the location where it was generated. IDW from groundwater well development will be characterized by groundwater samples collected from those wells following development. IDW from decontamination fluids will be sampled separately for any contaminants discovered in the groundwater. Section 5.0, includes a discussion of the IDW management process. A copy of the Investigative derived waste management plan is provided in Appendix B. A summary of the sampling and analysis program is presented in Table 4-1.

4.1.4 Quality Assurance / Quality Control Samples

Quality assurance/quality control (QA/QC) samples will be collected and analyzed according to the TtNUS COMPQAP. QC samples including equipment blanks, trip blanks, and field duplicates will be collected as outlined in Section 9.1 of the COMPQAP. The frequency with which the QC samples are collected is summarized in the box below. At least one field blank will also be collected during each field sampling event.

TABLE 4-1
ANALYTICAL PROGRAM SUMMARY

TANKS 681 & 682
NAS PENSACOLA, PENSACOLA FLORIDA

Analyte	Proposed Method	Env. Samples	IDW Samples (1)	Duplicate Samples	Rinsate Blanks (Aqueous)	Field Blank (Aqueous)	Trip Blanks (Aqueous)	Total Samples
GROUNDWATER								
PPL VOH	SW-846 8021B	12	0	2	3	2	2	21
PPL VOA plus MTBE	SW-846 8021B	12	0	2	3	2	2	21
PAHs	SW-846 8310	12	0	2	3	2	0	19
TRPHs	FL-PR0	12	0	2	3	2	0	19
1-2 Dibromoethane (EDB)	EPA 504	12	0	2	3	2	0	19
Total lead	E239.2/6010B Trace ICP or 7421	12	0	2	3	2	0	19
Dissolved Methane	RSK SOPs 175 and 147	3	0	0	0	0	0	3
Anions (nitrate, sulfate)	EPA 300	3	0	0	0	0	0	3
SOIL								
SPLP VOH, VOA, PAHs, and metals	SW-846 1312 followed by 8021B, 8310, FL-Pro, 6010B/7000A series	1	0	0	0	0	0	1
RCRA metals (2)	SW-846 6010B/7000A series	1	0	0	0	0	0	1
Fraction of Organic Carbon	ASTM 2974-87	1	0	0	0	0	0	1
Total Halides	SW-846 9020B	1	0	0	0	0	0	0
TOTAL		82	0	12	18	12	2	127

Method referenced reflects FDEP requirements.
All analyses are analyzed using standard 14-day laboratory turn around time.
1) IDW sample numbers based upon disposing of five 55-gallon drums (1 composite sample) of soil.
2) RCRA metals include arsenic, barium, cadmium, lead, chromium, mercury, selenium, and silver.

VOHs Volatile Organic Halocarbons
PPL Priority Pollutant List
VOA Volatile Organic Aromatics
MTBE Methyl-tert-butyl-ether
PAHs Polycyclic Aromatic Hydrocarbons
TRPHs Total Recoverable Petroleum Hydrocarbons
SPLP Synthetic Precipitation Leaching Procedure

Number of Samples	Precleaned Equipment Blank	Field-Cleaned Equipment Blank	Trip Blank (VOCs)	Duplicate
10+	minimum of one, then 5%	Minimum of one, then 5%	one per cooler	minimum of one, then 10%
5-9	one*	One*	not required	One
<5	one*	One*	not required	not required

*Note: For nine or fewer samples, a precleaned equipment blank and/or field-cleaned equipment blank is required. A field-cleaned equipment blank must be collected if equipment is cleaned in the field.

4.2 GENERAL SITE OPERATIONS

4.2.1 Field Team Organization

The TtNUS field personnel will consist of staff members who will be assigned temporary duty at NAS Pensacola and who will conduct the field investigation activities. The organization of the field team is described below.

- The Field Operations Leader (FOL) is responsible for the day-to-day direction of personnel in the field. The FOL will assign tasks to field team personnel, direct the sequence of activities, coordinate with NAS Pensacola personnel, coordinate subcontractors, and review tasks in progress and those completed. The FOL will ensure that project-specific plans are implemented and that activities are in compliance with appropriate guidelines. The FOL will oversee soil boring and monitoring well installation activities and may conduct various environmental sampling activities. Duties may include logging and documentation of drilling and well construction, environmental sample collection and handling, and ensuring that the approved methods are implemented. The FOL may also conduct tests for identifying subsurface conditions and characterizing the groundwater flow regime.

- The Project Safety Officer is responsible for ensuring that proper health and safety procedures are identified and implemented for the project and that project-related health and safety incidents are properly investigated. In the event that only a small number of project staff are required on site, the duties of the Project Safety Officer may be assigned to the FOL or another member of the field team. The Project Safety Officer or designee will report directly to the TtNUS Corporate Director of Health and Safety.

- Sampling Personnel will be responsible activities assigned by the FOL and for properly locating, collecting, preserving, packaging, documenting, and shipping environmental samples to the laboratory.

4.2.2 Mobilization

TtNUS must perform several internal tasks before field mobilizations. These tasks include the following:

- Preparation of technical and subcontractor bid specifications
- Selection and mobilization of subcontractors
- Acquisition and preparation of equipment for transportation to the field
- Acquisition and preparation of expendable supplies for transportation to the field
- Arrangement of transportation and lodging for field personnel

In addition to internal efforts, external mobilization efforts will be coordinated with the NAS Pensacola Point of Contact (POC). A list of the steps to be taken includes the following:

- Obtain keys to existing locks on wells (other than those installed by TtNUS)
- Set up the investigation field office and coordinate utilities hookup
- Select staging areas for equipment and IDW
- Select decontamination area(s) with electrical hookup, potable water, and drainage to an oil/water separator
- Complete security procedures for project and subcontractor personnel to gain access to the Base
- Ensure supplies of potable water are accessible
- Coordinate with Base personnel to locate buried utilities

Multiple decontamination facilities may be selected or constructed by the drilling subcontractor before the beginning of field activities at locations deemed appropriate by the Base POC and TtNUS. Site reconnaissance will be performed before initiation of field activities. Some of these activities will be performed with the assistance of NAS Pensacola personnel. These activities are listed below:

- Locating and setting up of decontamination facilities
- Identifying the potable water source(s), electrical outlets, and other utilities to be used during field activities
- Collecting and shipping to the laboratory a field blank of the potable water source to be used for field decontamination activities

- Locating temporary storage for soil cuttings and purge/development water drums as well as solid wastes generated during field activities (e.g., Tyvek suites, gloves, plastic sheeting)
- Reconnoitering and marking/staking sample locations
- Locating underground and aboveground utilities within the work areas (including water, gas, sanitary sewer lines, drainage lines, telephone cable, and electric lines). Electric lines may be shielded, if necessary
- Erecting any necessary barricades and/or temporary fencing

4.2.3 Field Investigation Activities

The planned activities for the CA include the following general categories of field investigation activities:

- Installation of soil borings and collection of subsurface soil samples using direct-push techniques
- Installation of shallow and deep groundwater monitoring wells
- Collection of groundwater samples
- Measurement of groundwater potentiometric level
- Field measurement of physical and chemical properties of soil and groundwater samples
- Decontamination of investigation equipment
- Sample management
- Field QC, documentation, and record keeping
- IDW management
- Location survey

Project-specific standard operating procedures (SOPs) will be given priority, followed by the FDEP COMPQAP and then USEPA Region IV SOPs when SOPs for the same task differ. Copies of all guidance documents will be located in the TtNUS field office at NAS Pensacola. Table 4-2 presents a cross-reference guide to the applicable SOPs for the general field activities listed above. Table 4-2 focuses on the SOPs deemed most likely to be used by the field investigation team. If activities arise that are not referenced in Table 4-2, then the project-specific SOPs, COMPQAP, the USEPA Region IV SOPs, or Navy guidance will be followed (in that order) with approval by FDEP, and Navy personnel. Project-specific SOPs referenced in Table 4-2 are discussed in the following sections.

TABLE 4-2

**STANDARD OPERATING PROCEDURES CROSS REFERENCE[a]
CONTAMINATION ASSESSMENT PLAN
TANKS 681 682
NAS PENSACOLA
PENSACOLA, FLORIDA
PAGE 1 OF 2**

ACTIVITY	FDEP[b]		EPA-4[c]		Tetra Tech NUS, Inc.[d]	
SOIL SAMPLING						
General	A	4.0 / 4.3.1-4.3.2	A	12.3		
Manual Sampling	A	4.3.4	A	12.3.1		
Power-Driven Sampling	A	4.3.4.5	A	12.3.2		
VOC Samples	A	4.3.2	A	5.13.9 / 12.4.1		
Sample Mixing	A	4.3.2	A	5.13.8		
DRILLING						
Safety			A	6.7		
Direct-Push					A*	4.2.4
Augering			A	6.3.1		
Rotary			A	6.3.3		
Abandonment			A	6.9		
WELL CONSTRUCTION						
Overdrilling			A	6.4.2		
Annular Space			A	6..4.1		4.2.5
Casing and Screen			M	6.6.2	A*	4.2.5.1
Installing the Well			M	6.5.1 / 6.5.2		4.2.5
Filter Pack			A	6.4.3 / 6.6.3		4.2.5
Filter Pack and Screen Design			M	6.6.4	A*	4.2.5.2
Well Seal and Grouting			A	6.4.4 / 6.4.5		4.2.5
Surface Completion			A	6.4.6 / 6.4.7 / 6.4.8		4.2.5.5
Development			A	6.8		4.2.5.7
Temporary Wells			A	6.1		
GROUNDWATER SAMPLING						
General	A	4.0 / 4.2.1 / 4.2.5.2				
Purging		4.2.5.3-4.2.5.5	A	7.2.1 / 7.2.2 / 7.2.4		
Sample Methods		4.2.5.6	A	7.3.1 / 7.3.3		
Sample Containers / Preservation	A	4.2.2	A	7.3.4		
Trace Organic and Metals	A	4.2.5.6 (g)	M	5.13.9 / 7.3.5		
Temporary Wells	A	4.2.9				
Auxillary Data			A	7.3.7		
FIELD MEASUREMENTS						
Groundwater Levels	A	4.2.5.4	M	15.8	A*	4.2.7
pH, Temperature, Conductivity	A	7.5.2 / 7.5.3 / 7.5.5	A	16.2-16.4		
Dissolved Oxygen	A	7.5.4	A	16.7		4.2.9
Turbidity			A	16.5		
Redox Potential					A*	4.2.8
Ferrous Iron (Fe++)						
Air Monitoring / Head Space	A	7.5.7			A*	4.2.10
Residual Product Detection					A*	4.2.7

TABLE 4-2

STANDARD OPERATING PROCEDURES CROSS REFERENCE[a]
CONTAMINATION ASSESSMENT PLAN
TANKS 681 682
NAS PENSACOLA
PENSACOLA, FLORIDA
PAGE 2 OF 2

ACTIVITY		FDEP[b]		EPA-4[c]		Tetra Tech NUS, Inc.[d]	
DECONTAMINATION							
	General	A	4.1.1 / 4.1.3				4.2.6
	Reagents	A	4.1.2				4.2.6
	Sampling Equipment	A	4.1.4			A*	4.2.6
	Filters	A	4.1.6				
	Tubing	A	4.1.7.1-4.1.7.5				
	Pumps	A	4.1.8				
	Field Equipment	A	4.1.9.1 / 4.1.9.2			A*	4.2.6
	Analyte-Free Water Containers	A	4.1.10				
	Ice Chests / Shipping Containers	A	4.1.11				
SAMPLE HANDLING							
	General			A	5.13.3 / 5.13.7		
	Sample Containers	A	4.4.1				
	Preservation and Holding Times	A	4.4.2	A	5.13.6		
	Documentation	A	5.0 / 5.3	A	3.3		
	Sample Identification	A	5.3.2	A	3.2.1	A*	4.2.11
	Packing and Transportation	A	4.4.3.2				
FIELD QUALITY ASSURANCE/QUALITY CONTROL							
	Field Calibration	A	7.5				
	Field Equipment Decontamination		7.5..1				
	Quality Control Samples	A	9.1				
	Control Limits	A	7.5			A*	4.2.12
	Corrective Action	A	11			A*	4.2.13
INVESTIGATION-DERIVED WASTE							
	Investigation Waste Disposal	A	4.4.5			A*	5.0
	Nonhazardous Waste			A	5.15 / 5.15.1		
	Hazardous Waste			A	5.15 / 5.15.2		
RECORDKEEPING							
	Field Logbooks and Forms			A	3.5	A*	4.2.14
	Manufacturer's Specifications					A*	4.2.15
	Chain-of-Custody Forms	A	5.3				
	Field Calibration Records	A	7.8				
SURVEYING							
	GPS Surveys					A*	4.2.18.1
	NGVD Surveys					A*	4.2.18.2

[a] Annotations found in this reference table indicate the following:

A – Standard Operating Procedure (SOP) that is fully adopted.

A* – Standard Operating Procedure (SOP) that is under review.

M – Modification of existing Florida Department of Environmental Protection (FDEP) or U.S. Environmental Protection Agency (EPA) SOP documented in project-specific SOP.

[b] Denotes FDEP SOPs adopted by Tetra Tech NUS, Inc., source:
FDEP Comprehensive Quality Assurance Plan #980038, 1999.
Number shown indicates the chapter and section in the FDEP SOPs.

[c] Denotes EPA Region IV Environmental Investigations SOPs and Quality Assurance Manual, May 1996. Number shown indicates the section in the EPA SOPs.

[d] Denotes project-specific SOPs adopted by or prepared by Tetra Tech NUS, Inc. for the conduct of work at Naval Air Station Pensacola.
Number shown indicates the text section in which the SOP may be found.

GPS – Global Postioning System

NGVD – Natural Geodetic Vertical Datum

VOC – volatile organic compound

4.2.4 Direct-Push Soil Sampling

A direct-push technology (DPT) soil sampling device (e.g., Geoprobe® system) will be used to obtain subsurface soil samples at NAS Pensacola. Unlike conventional drilling techniques, DPT probing tools do not create an open borehole into which soil sampling devices are inserted. DPT allows investigators to push a closed sampler to depth, open the sampler, and obtain a discrete soil sample that is relatively undisturbed. For this project a DPT sampler may be used for collecting shallow soil samples.

The soil samples may be collected from any discrete depth interval, but will typically be collected from above the zone of perched groundwater saturation. The DPT sampler typically has an inner diameter of 1 to 2 inches and recovers a soil core measuring 2 to 4 feet in length. Liners made of material compatible with the contaminants of interest will be used inside the soil sampler to keep the sample intact after it is extruded from the sampler and to reduce the likelihood of cross-contamination or false-positive laboratory results.

To collect a sample the DPT sampler is attached to the leading end of the pushing rods and driven in a closed and sealed position into the subsurface soil using a hydraulic and/or percussion driver. At the top of the desired sampling interval, the pushing is temporarily stopped and an internal release mechanism in the sampler is triggered using extension rods inserted down the inside of the push rods. After the release is activated, the sampler is again driven forward, collecting soil in the sample tube as a piston retracts. The probe assembly is then retrieved and the soil sample is removed for examination.

After removal from the sampler barrel, the sample is extracted and placed on a fresh, clean surface. If a liner is used, it is separated into four 6-inch-long sections (along perforations in the brass liners), and the exposed soil is screened with an FID. Samples selected for laboratory analyses will be immediately placed into laboratory-supplied containers. If liners are used, the open ends will be covered with clean, Teflon™ tape, capped, and sealed with exterior tape. The samples will be labeled, preserved on ice, and transported to the laboratory. All portions of the probe assembly that are inserted into the ground will be decontaminated before each use using standard decontamination procedures (see Table 4-2). When samples are collected for analysis of volatile organics, a series of three Encore samples will be collected and shipped to a qualified laboratory for laboratory sodium bisulfate preservation and analysis by USEPA Method 5035.

4.2.5 Monitoring Well Installation

4.2.5.1 Well Casing and Screen Materials

All monitoring wells will be constructed of Schedule 40 polyvinyl chloride (PVC) casing and screen manufactured for environmental applications (i.e., no inked markings, shipped clean in individual, sealed wrappings) and meeting the requirements of the American Society for Testing and Materials (ASTM) F 480 and D 1785. This variance from the USEPA Region IV SOPs' requirement for stainless steel casing and screen materials is based on previous investigation results which identify background groundwater quality (e.g., pH) and dissolved contaminants in groundwater (e.g., petroleum hydrocarbons) are not present at concentrations detrimental to the use of PVC. The use of PVC will make the construction of these wells consistent with that of wells previously installed at NAS Pensacola. If conditions are encountered where the use of PVC in well construction is inappropriate, then stainless steel or another suitable material will be selected and presented to the FDEP, and Navy personnel for approval before being used.

4.2.5.2 Filter Pack and Screen Design

The USEPA Region IV SOPs (USEPA 1996b) require that the filter pack used for monitoring well annular space be selected based on grain size analysis of the formation interval adjacent to the well screen interval. This guidance will be followed during additional assessment for aquifer zones where previous investigations have analyzed the formation intervals of interest and for which the grain size data are available. When this information is not available, well construction will follow the previous investigation practice of using a 20/30-size gradation filter material coupled with a 0.010-inch, factory-slotted well screen. This filter pack size and screen slot size combination has previously been used at NAS Pensacola, and groundwater samples of acceptable quality have been obtained.

The 20/30 filter size is compatible with a formation that has a D30 size (i.e., 30 percent finer by weight than the D30 sieve size) in the range of fine sand. If visual inspection of the drill cuttings or split-spoon samples indicates that the D30 size of the formation is significantly coarser than this range (e.g., uniform medium to coarse sand and/or gravel), then an alternate filter pack and screen slot size combination will be recommended in accordance with the USEPA Region 4 SOPs (USEPA 1996b).

4.2.5.3 Shallow Well Installation

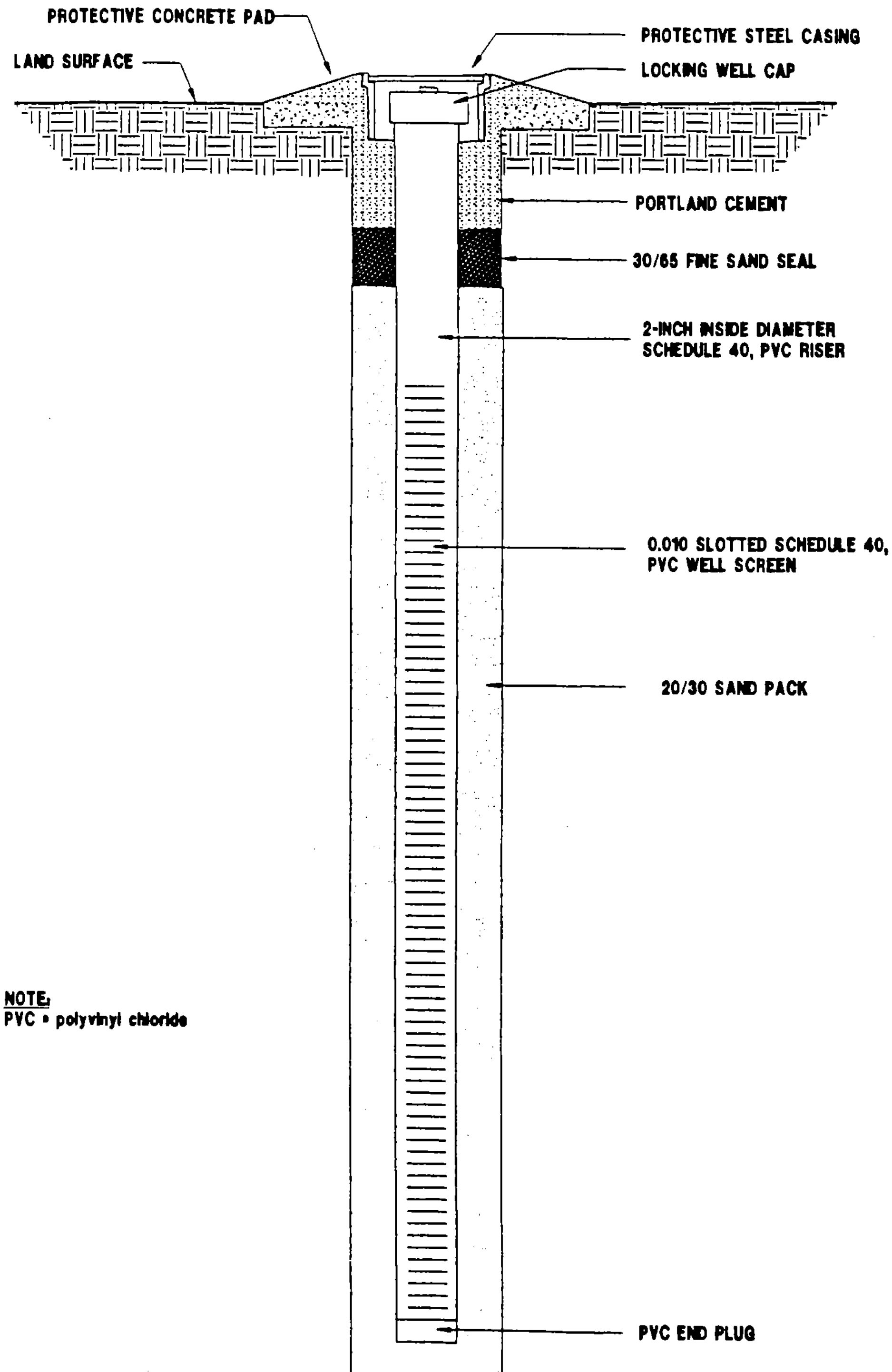
The shallow monitoring wells will be installed using a DPT rig. The shallow wells will be completed to depths from 15 to 20 feet bls, as determined from the data gathered during the soil boring program All monitoring wells will be set in place using a DPT sampling rig. All wells will be constructed of 1¼-inch or 2-inch inside diameter (ID) PVC casing with 10 feet of 0.010-inch PVC slotted screen. Screened sections will incorporate a pre-packed filter media. A fine sand seal at least 2 feet thick, will be installed on top of the prepacked filter media. The remainder of the annulus of the borehole will be grouted by pumping a cement/bentonite slurry through a tremie pipe up to 2 feet bls. The well screens will be placed such that the screens bracket the water table.

4.2.5.4 Deep Well Installation

The deep well will installed using a DPT rig. The borehole is expected to be approximately 35 feet bls. The wells will be constructed of 1¼-inch or 2-inch-diameter, Schedule 40 PVC, flush-threaded casing with 5-feet of 0.01-inch factory-slotted, PVC screen. Screened sections will incorporate a pre-packed filter media. A fine sand seal at least 2 feet thick, will be installed on top of the prepacked filter media. The remainder of the annulus of the borehole will be grouted by pumping a cement/bentonite slurry through a tremie pipe up to 2 feet bls. The well screens will be placed such that the screens bracket the water table. Diagrams of typical shallow and deep monitoring well construction are illustrated in Figures 4-1 and 4-2, respectively.

4.2.5.5 Well Surface Completion

Each monitoring well surface completion will be flush mount. The riser pipe will be cut to approximately 3 inches bls using an inside pipe cutter and a v-notch will be cut into the north edge of the top of casing for surveying purposes. A protective steel casing will be flush-mount installed around each monitoring well. The flush-mount covers shall be a minimum 8-inch round security vault provided with sealing gasket to reduce the amount of water infiltration. A 2-foot by 2-foot (saw-cut or saw-scored and jack hammered hole) by 6-inch thick concrete apron will be constructed around each flush mount monitoring well. The flush mounted casings shall be completed 1-inch above existing grade and the apron tapered to be flush with existing grade at the edges such that water will run off of the apron. The protective casing shall be completed with a metal identification tag.



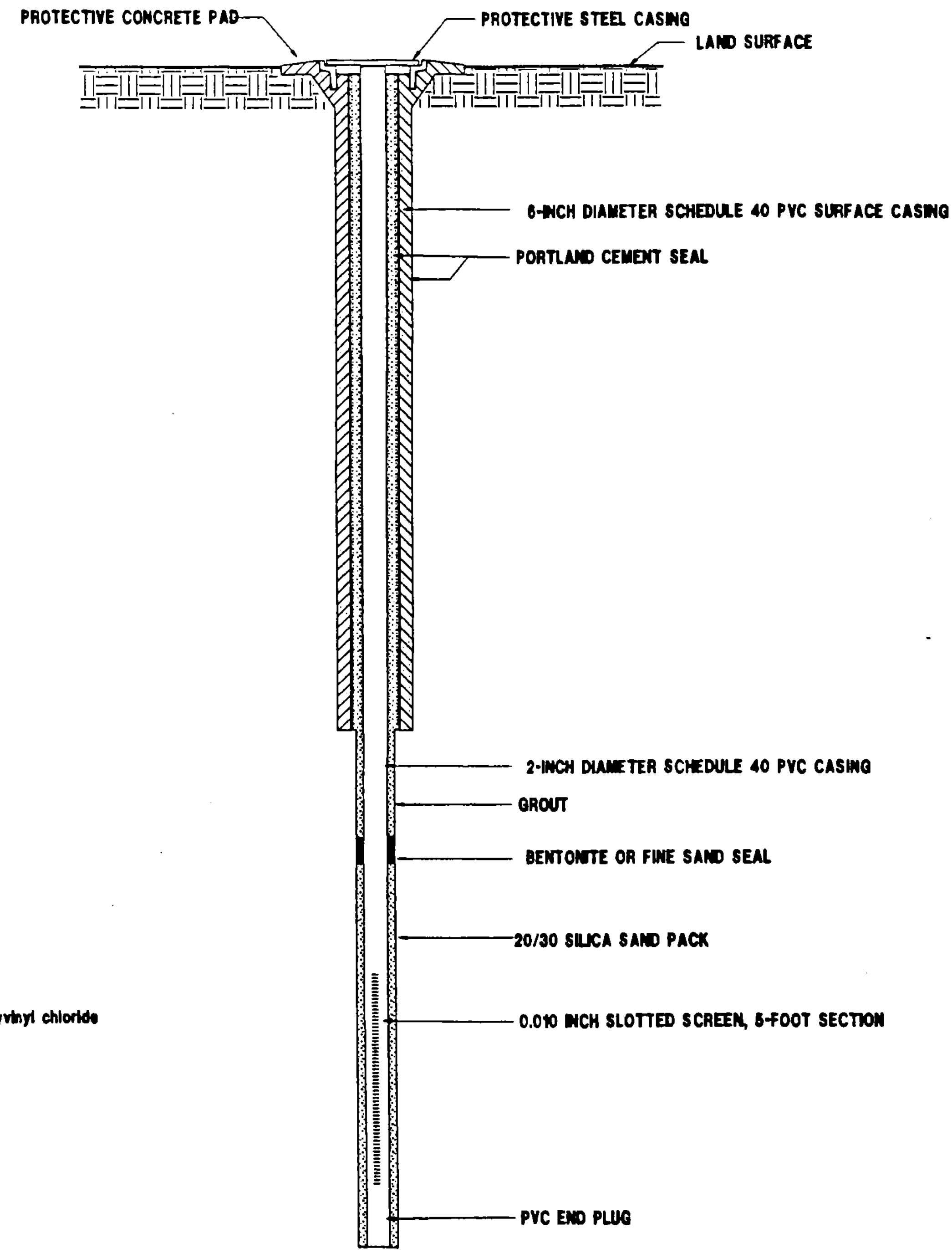
NOTE:
PVC = polyvinyl chloride

NOT TO SCALE

FIGURE 4-2
TYPICAL SHALLOW MONITORING WELL
INSTALLATION DETAIL

CONTAMINATION ASSESSMENT
PLAN
TANKS 681 & 682

NAS PENSACOLA
PENSACOLA, FLORIDA



NOTE:
PVC = polyvinyl chloride

NOT TO SCALE

FIGURE 4-3
TYPICAL DEEP MONITORING WELL
INSTALLATION DETAIL

CONTAMINATION ASSESSMENT PLAN
TANKS 681 & 682

NAS PENSACOLA
PENSACOLA, FLORIDA

The tag specifications include:

- 4" x 4" x 0.032" stainless steel or aluminum;
- 3/16" lettering;
- 1/8" diameter mounting holes; and
- Black printed or stamped lettering.

4.2.5.6 General Drilling Requirements

The only drilling fluid used will be potable water. In addition, lubricants used on the rig will not introduce or mask chemicals of concern (COCs) at the site being investigated. All trash, waste, grout, cuttings, and drilling fluids associated with the drilling activities will be disposed of by the drilling subcontractor in accordance with the methods previously used by the Clean I contractor at NAS Pensacola.
The items listed below will also be part of the SOP for drilling.

- All data related to well construction will be documented on a monitoring well sheet (Appendix C).
- Each well will be constructed by a driller and drilling company certified by the State of Florida.
- Well locations will be approved by the Base POC before installation.
- Glue will not be used to join screen or casing.
- At any well nest location, the deep well will be installed first to prevent invasion of drilling fluids into the shallower wells.
- Lithologic soil samples will be taken continuously by using 5-foot continuous samplers at the deep well location only.
- A notch will be cut into northern point of the top of the casing to be used as a reference point for the elevation survey and for measuring water levels.

4.2.5.7 Well Development

Monitoring wells will be developed to remove fine-grained sediments and smearing of drill cuttings from along the borehole wall. The preferred method of development will be surging alternating with pumping. All development equipment will be decontaminated before being placed in the well. Throughout the development procedure, discharge water color and volume shall be documented.

Wells will be developed until the following criteria are achieved:

- Stabilization of the following parameters occurs:
  - temperature plus or minus 1°C,
  - pH plus or minus 1 unit, and
  - electrical conductivity plus or minus 5 percent of scale; and
- Turbidity remains within a 10 Nephelometric Turbidity Unit (NTU) range for 2 consecutive readings;
- Accumulated sediment is removed from the well.

The well development process will begin no sooner than 24 hours after well installation. Detergents, bleaches, soaps, or other such items will not be used to develop a well. Following development and after the water levels have been allowed to stabilize a minimum of 24 hours, the static water level will be measured and recorded. All data related to well development, including alternate development methodologies and their justification, will be written on the well development sheet (Appendix C) or in the field logbook.

4.2.6 Decontamination Procedures

The decontamination of major equipment (e.g., drilling rigs, dump trucks, backhoes) and sampling equipment (e.g. split-spoons) will minimize the spread of contamination to clean zones, reduce cross-contamination of samples when equipment is used at more than one sampling location, and minimize exposure to site personnel.

Major equipment will be decontaminated at the NAS Pensacola equipment decontamination area established by the CLEAN I or CLEAN II contractors. Sampling equipment will be decontaminated in tubs or drainage pans to allow rinse water to collect for disposal. Rinsate samples will be collected from the decontaminated sampling equipment by rinsing the clean equipment with analyte-free water. The sampling equipment will then be wrapped in aluminum foil and stored in a clean area until use. Clean sampling equipment will not be allowed to come into contact with the ground or any potentially contaminated surfaces before use at the sampling location.

Disposable material (e.g., gloves, Tyvek suits) generated during decontamination will be bagged and stored in drums for proper disposal at an off-base location.

4.2.6.1 Soil Sampling Equipment

All stainless steel spoons, bowls, and other soil-sampling equipment will be decontaminated after each use. The decontamination procedure outlined below will be used.

- Wash and scrub the equipment with a solution of Liquinox (or equivalent) and potable water;
- Rinse with potable water;
- Rinse non-steel equipment with 10 to 15 percent reagent-grade nitric acid ($HN0_3$) when sampling for trace metals;
- Rinse with analyte-free water;
- Rinse twice with isopropanol;
- Rinse with analyte-free water;
- Air dry (if possible); and
- Wrap in oil-free aluminum foil (if appropriate).

4.2.6.2 Water Sampling Equipment

Submersible and peristaltic pumps will be used to purge and collect water samples. Dedicated Teflon™ discharge lines will be used for each location for each sampling location. The interior and exterior of submersible pumps will be cleaned between each sampling location. The exterior casing of peristaltic pumps will be cleaned between each sampling location. Pump decontamination procedures are as follows:

- Wash with Liquinox and potable water;
- Rinse with potable water; and
- Rinse with analyte-free water.

Groundwater samples will be collected using low flow quiescent sampling methods or bailers. Bailers will be decontaminated after each use. Stainless steel or Teflon™-coated lines will be dedicated to each well for each sampling event or will be decontaminated between uses.

Equipment will be decontaminated in the manner outlined below.

- Wash and scrub equipment with a solution of Liquinox (or equivalent) and potable water.
- Rinse with potable water.
- Rinse non-steel equipment with 10 to 15 percent reagent-grade $HN0_3$ when sampling for trace metals.
- Rinse with analyte-free water.
- Rinse twice with isopropanol.
- Rinse with analyte-free water.
- Air dry (if possible).
- Wrap in oil-free aluminum foil.

Any additional equipment used in sampling will be decontaminated by following the procedure outlined above.

4.2.6.3 Major Equipment

Between each well or boring, all major equipment used for sample collection such as drill rigs and backhoes will be decontaminated at the existing NAS Pensacola equipment decontamination area formerly used by the CLEAN I and CLEAN II contractors. Decontamination will consist of steam-cleaning, washing with Liquinox (or equivalent), and rinsing with potable water. If necessary, surfaces will be scrubbed until all visible soil and possible contaminants have been removed. All dirt, grime, grease, oil, loose paint, and rust flakes shall be removed. The inside surfaces of the casing and drill rods will be similarly cleaned. The decontamination area will be constructed and operated to contain all solids and liquids produced. Liquids will be directed to an oil/water separator before release to the Base's sanitary sewer system. Solids will be retained and tested to determine appropriate disposal.

4.2.7 Groundwater Level Measurements

Measurement of the depth to water in monitoring wells will be performed according to the COMPQAP and USEPA Region IV SOPs, with the exception that measuring devices will not be calibrated against an Invar steel surveyor's chain. The devices will be calibrated against each other to ensure that accurate relative measurements are made during the data collection event. The results of the calibration will be recorded in the field logbook.

A minimum of one complete round of water level measurements will be obtained from all new and existing monitoring wells. All measurements will be collected within a 48-hour period of consistent weather conditions to minimize atmospheric/precipitation effects on groundwater conditions. Measurements will be collected at least 24 hours after well development using an electrical water level indicator. A permanent reference point on the top of each well casing will be used for determining the depth to water. Water level measurements will be recorded in the field logbook to the nearest 0.01 foot. Static water levels will be measured in each well before any fluid is withdrawn. If floating hydrocarbon is detected in the monitoring wells, the thickness of the free product will be measured with an electronic interface probe.

4.2.8 Oxidation-Reduction Potential of Groundwater

The oxidation-reduction (Redox) potential of groundwater will be measured to support an evaluation of the potential for natural attenuation of organic contaminants in groundwater. Redox potential will be determined in the field using a portable field meter at selected monitoring wells. Because of the sensitivity of Redox potential to oxygenation and disturbance of the groundwater sample, care will be used to obtain the sample, and the analysis will be performed at the well head immediately after sample collection.

Calibration and maintenance of the Redox meter will be performed in accordance with the manufacturer's instructions. These actions will be documented in the field logbook and/or on an equipment calibration log as presented in Appendix C.

4.2.9 Dissolved Oxygen in Groundwater

Dissolved oxygen (DO) in groundwater will be measured using a meter to support an evaluation of the potential for natural attenuation of organic contaminants. DO analyses will be performed in accordance with the manufacturers' instructions. Care will be exercised to avoid entrainment of atmospheric oxygen or loss of DO in groundwater samples. Water samples will be collected using a low-flow peristaltic or bladder pump.

4.2.10 Sample Head Space Analysis

Soil vapor head space analyses will be performed according to the method prescribed in FDEP Rule 62-770.200(8) of the Florida Administrative Code (FAC). Soil samples will be analyzed for their total hydrocarbon content using an OVA equipped with a FID. A photoionization detector (PID) may be used only after a determination of the instrument's equivalent response to a FID has been made. Charcoal filters will be used to differentiate between methane (a naturally occurring gas) and petroleum hydrocarbon vapors.

The following steps will be used to prepare soil samples for head space analysis:

- Each soil sample to be analyzed will be equally split and placed into 2 clean, 16-ounce glass jars.
- Each sample jar will filled to approximately one-half of its volume, if sufficient sample volume is available.
- Aluminum foil covers will be sealed over the open end of the glass jar using a threaded, metal ring.
- The sample jars will be allowed to equilibrate under a temperature range of 20–30°C for approximately 5 minutes.
- The head space will be measured by piercing the aluminum foil with the FID probe and recording the highest sustained reading .
- The FID will be calibrated daily and calibration will be confirmed every 20 samples.
- If FID readings above background are detected in the first jar, the second sample jar will be measured using an in-line charcoal filter to determine the portion of the total reading attributable to methane gas.

4.2.11 Laboratory Sample Identification

The sample identification system to be used in the field to identify each sample taken during the CA field effort will be in accordance with TtNUS SOP CT-O4, contained in Appendix D. The coding system provides a tracking record to allow the retrieval of information about a particular sample and to ensure that each sample is uniquely identified.

Each sample is assigned a series of codes indicating the site (e.g., PEN-MW), sample type, sample location, sample depth, and sample round (i.e., sequential order or date). The sample nomenclature system has been designed to maintain consistency between field, laboratory, and database sample numbers. In addition, the system facilitates cost-effective data evaluation because data can be easily sorted by matrix and/or depth or by other such parameters.

4.2.12 Field Instrument Control Limits

QA/QC specifications for field measurements are summarized in Table 4-3. This table shows the control parameters to be assessed, control limits, and corrective actions to be implemented.

TABLE 4-3

FIELD QA/QC SPECIFICATIONS
CONTAMINATION ASSESSMENT PLAN
TANKS 681 & 682
NAS PENSACOLA
PENSACOLA, FLORIDA

Analysis	Control Parameter	Control Limit	Corrective Action
Air monitoring using an organic vapor analyzer (FID)	Daily check of calibration of FID	Calibration to manufacturer's specifications	Recalibrate. If unable to calibrate, replace.
pH of water	Continuing calibration check of pH 7.0 buffer	pH = 7.0 ± 0.1	Recalibrate. If unable to calibrate, replace electrode.
Specific conductance of water	Continuing calibration check of standard solution	± 1% of standard	Recalibrate.
Temperature of water	Check against NIST precision thermometer	± 0.1°C at two different temperatures	Reset thermistors in accordance with manufacturer's specifications; dispose of inaccurate thermometer.

FID – flame ionization detector
NIST – National Institute of Standards and Technology

The TtNUS representative on site at each well and boring will confirm measurements of total depth of holes, dimensions and placement of well screens and casings, and volume and placement of filter pack and grout materials by independent observation or measurement. The FOL will review field forms and field logbook entries for indications of measurement data outside of the control range.

4.2.13 Corrective Actions

Comprehensive QA activities will be conducted by TtNUS to ensure data obtained from the sampling program as well as the resultant work products are technically valid. Any staff member engaged in project work who discovers or suspects a nonconformance is responsible for identifying and segregating (if applicable) the nonconforming item as well for forwarding a report to the Task Order Manager and QA Manager for investigation and corrective action. The QA Manager has the responsibility for assuring the overall adequacy of corrective actions and summarizing this information in a status report to TtNUS management.

Before its use in the field, each instrument will be calibrated prior to field use to ensure its capable of producing usable data indicative of site conditions. QC data, such as duplicate field measurements or QC check standards, will be collected for field instruments and used to evaluate the continued acceptable performance of each instrument. Table 4-3 lists the corrective actions to be implemented whenever field instruments fail to meet the established control limit criteria.

Field data will be reviewed by the site geologist while in the field. Extreme readings (i.e., readings that appear significantly different from other readings at the same site) will be accepted only after the instrument has been checked for malfunction and the readings have been verified by retesting (with an alternate instrument, if possible).

QC data obtained from field duplicates, field blanks, trip blanks, or equipment blanks will be collected and assessed by the QA Manager or the cognitive Task Order Manager to evaluate the overall quality of the sample collected. Whenever the results of the field QC samples fail to meet the acceptance criteria, as identified in Table 4-3, corrective actions will be initiated.

Potential corrective actions will be dependent upon the final use of the data; however, appropriate corrective actions may include the following, as determined by the Task Order Manager in conjunction with the QA Manager:

- Evaluation of the suspect QC data by comparison to other QC samples taken at the same site or on the same date or analyzed by the same equipment/technician for similar contamination
- Reanalysis of the QC sample in question (if possible)
- Qualification of the results
- Resampling

Non–TtNUS parties involved in identified nonconformances will be notified initially by telephone with a follow-up formal correspondence explaining the deficiency. The responsible outside parties will be required to investigate the nonconformance and offer an appropriate corrective action. Notification, tracking, and ultimate closure of reported nonconformances and the review/approval of submitted corrective actions will be the responsibility of the TtNUS QA Manager.

4.2.14 Field Logbooks and Forms

Field logbooks and standard data collection forms will be completed for field investigation, sample description, and data collection activities. These forms include sample log sheets (for soil and groundwater samples), a daily record of drilling activities, and equipment calibration logs. An example of these forms can be found in Appendix C.

A bound, weatherproof field logbook shall be maintained by each sampling event leader. The FOL or designee will record all information related to sampling or field activities. This information may include sampling time, weather conditions, unusual events (e.g., well tampering), field measurements, descriptions of photographs, or other such details. A site logbook shall be maintained by the FOL. The requirements of the site logbook are outlined in SOP SA-6.3, attached in Appendix D. This book will contain a summary of the day's activities and will reference the field logbooks when applicable.

Each field team member who is supervising a drilling subcontractor must complete a daily record of drilling activity. This form documents the stage, hours, methods, materials, and supplies used during daily drilling activities. The information contained on this form is used for billing verification and progress reports. The driller's signature is required at the end of each working day to verify work accomplished, hours worked, standby time, and material used. An example of this form is provided with SOP SA-6.3 in Appendix D.

At the completion of field activities, the FOL will submit to the Task Order Manager all field records, data, field logbooks, site logbooks, chain-of-custody receipts, sample log sheets, drilling logs, daily logs, and other such forms.

4.2.15 Manufacturers' Specifications

The FOL shall collect a copy of the available manufacturers' specifications for all supplies and equipment that are used in the collection of environmental samples.

This shall apply to, but not be limited to, the following:

- Calibration gases
- Sample containers
- Decontamination solvents and detergents
- Laboratory-grade/analyte-free water
- Reagents
- Drilling additives
- Bentonite and cement
- Filter pack materials
- Well casing and screen
- Disposable bailers, filters, and tubing

The manufacturers' specifications will be included in the project files at the end of the field mobilization.

4.2.16 Surveying

4.2.16.1 Global Positioning Survey Locations

The locations of sample points, soil borings, and wells may initially be determined during the field investigation using a portable Global Positioning Survey (GPS) instrument with sub-meter accuracy. This information may be helpful in plotting results and analyzing the data coverage in real-time to make data acquisition decisions during the CA field activities. The GPS instrument will be used in accordance with the manufacturer's instructions, and the results will be recorded in the field records. Monitoring wells and other selected points will be permanently located using a national geodetic vertical datum (NGVD) survey at the close of the field mobilization.

4.2.16.2 National Geodetic Vertical Datum Survey Locations

The locations of monitoring wells installed during the CA field activities will be measured by a certified land surveyor. Each point will be measured from a reference location that is tied to the Florida State Plane Coordinate System. An X–Y coordinate system shall be used to identify locations. The X coordinate will be the east–west axis; the Y coordinate will be the north–south axis. The reference location will be the origin.

All surveyed locations will be reported using the Florida State Plane Coordinate System. Existing installation benchmarks will serve as the horizontal and vertical datum for the survey. Elevations and horizontal locations will be recorded to the nearest hundredth of a foot. The elevations of all monitoring wells will be surveyed at the water level measuring reference point on the top of the well casing and on the undisturbed ground surface adjacent to the well pad.

4.3 PREPARATION OF REPORTS.

4.3.1 Site Assessment Reports (SAR)

A SAR will be prepared and submitted to SOUTHNAVFACENGCOM and the NAS Pensacola upon completion of the field investigation. The SAR will discuss site background information, hydrogeology, geology, site-specific information, findings, and recommendations for each site. Facility and site location maps will be included in this report. Recommendations shall be made as to the need for any follow-up reports.

4.3.2 Follow Up Reports

If recommended in the SAR, a No Further Action (NFA) or Monitoring Only Plan (MOP) will be prepared to address petroleum hydrocarbon constituents identified at the site.

5.0 INVESTIGATIVE DERIVED WASTE

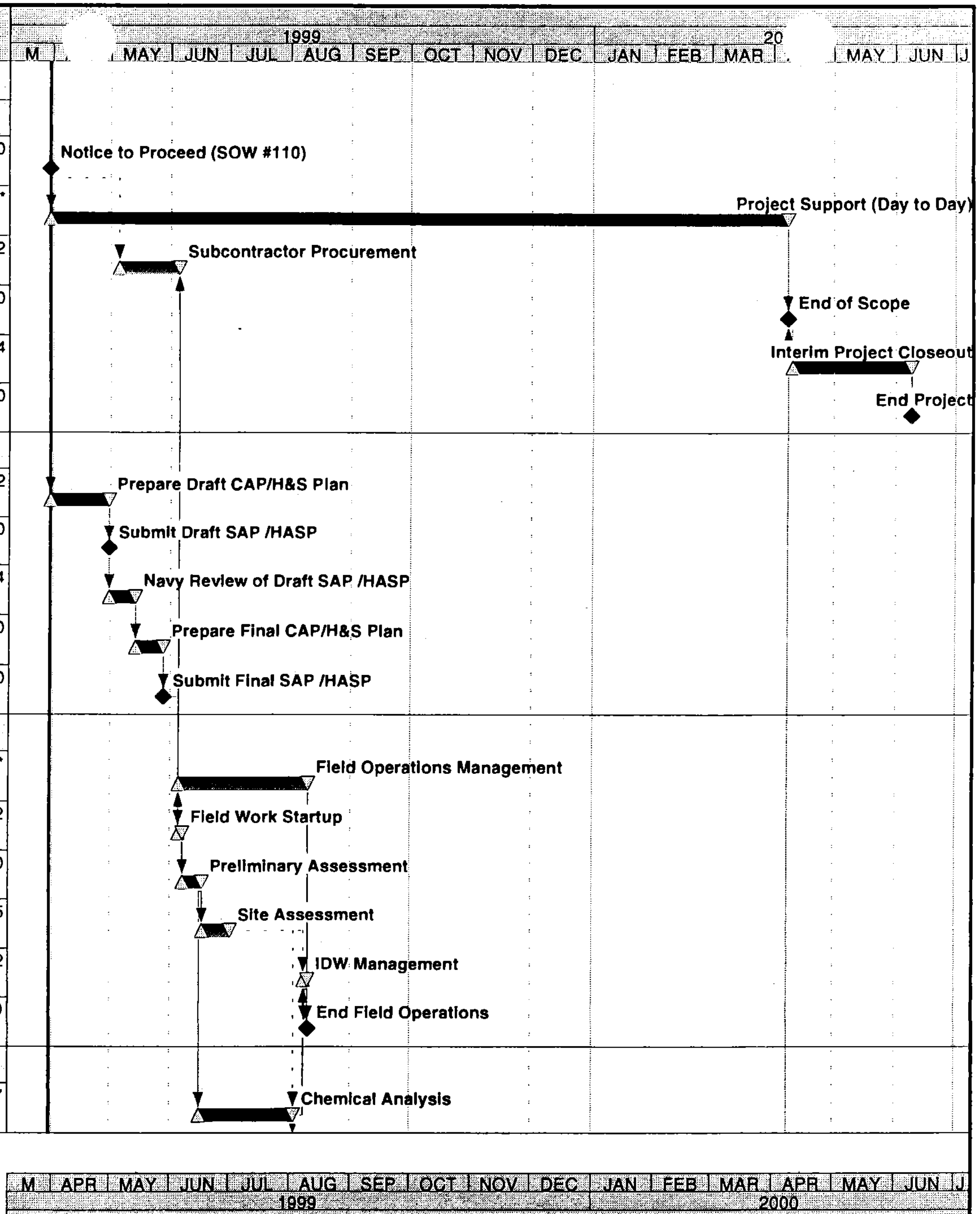
IDW generated during the CA field activities will be managed in accordance with the procedures described in the NAS Pensacola *Investigation-Derived Waste Management Plan* (EnSafe 1996a). This document, which is included as Appendix B of this document, emphasizes management of all IDW in an environmentally responsible manner consistent with the CERCLA program, Resource Conservation and Recovery Act (RCRA) requirements, and the base's standard procedures. The objectives of the IDW management plan include:

- Management of IDW in a manner that prevents contamination of uncontaminated areas (by IDW) and is protective of human health and the environment
- Minimization of IDW to reduce disposal costs and the potential for human or ecological exposure to contaminated materials
- Compliance with federal and state requirements for the transport and disposal of IDW material

6.0 SCHEDULE

Figure 6-1 depicts a Gantt Schedule, indicating the estimated duration and initiation/completion dates of individual tasks for the CA Program at Tanks 681 & 682.

Activity ID	Activity Description	Cal ID	Early start	Early finish	Orig Dur
SOW 110 NAS PENSACOLA - SI @UST 014					
PROJECT MANAGEMENT					
EP0010050	Notice to Proceed (SOW #110)	2	31MAR99		0
EP0010110	Project Support (Day to Day)	1	31MAR99	07APR00	372*
EP0010115	Subcontractor Procurement	2	05MAY99	04JUN99	22
EP0010120	End of Scope	2		07APR00	0
EP0010220	Interim Project Closeout	2	10APR00	08JUN00	44
EP0010225	End Project	2		08JUN00	0
PLANNING DOCUMENTS					
EP0040110	Prepare Draft CAP/H&S Plan	2	31MAR99	29APR99	22
EP0040112	Submit Draft SAP /HASP	2		29APR99	0
EP0040120	Navy Review of Draft SAP /HASP	1	30APR99	13MAY99	14
EP0040125	Prepare Final CAP/H&S Plan	2	14MAY99	27MAY99	10
EP0040150	Submit Final SAP /HASP	2		27MAY99	0
FIELD INVESTIGATIONS					
EP0050110	Field Operations Management	1	05JUN99	09AUG99	65*
EP0050115	Field Work Startup	1	05JUN99	06JUN99	2
EP0050120	Preliminary Assessment	1	07JUN99	16JUN99	10
EP0050130	Site Assessment	1	17JUN99	01JUL99	15
EP0050240	IDW Management	1	08AUG99	09AUG99	2
EP0050255	End Field Operations	1		09AUG99	0
LABORATORY ANALYSIS					
EP0060105	Chemical Analysis	1	16JUN99	02AUG99	47



Project Start	31MAR99
Project Finish	08JUN00
Data Date	31MAR99
Run Date	02APR99

Early Bar
Progress Bar
Critical Activity

PORT:EP01

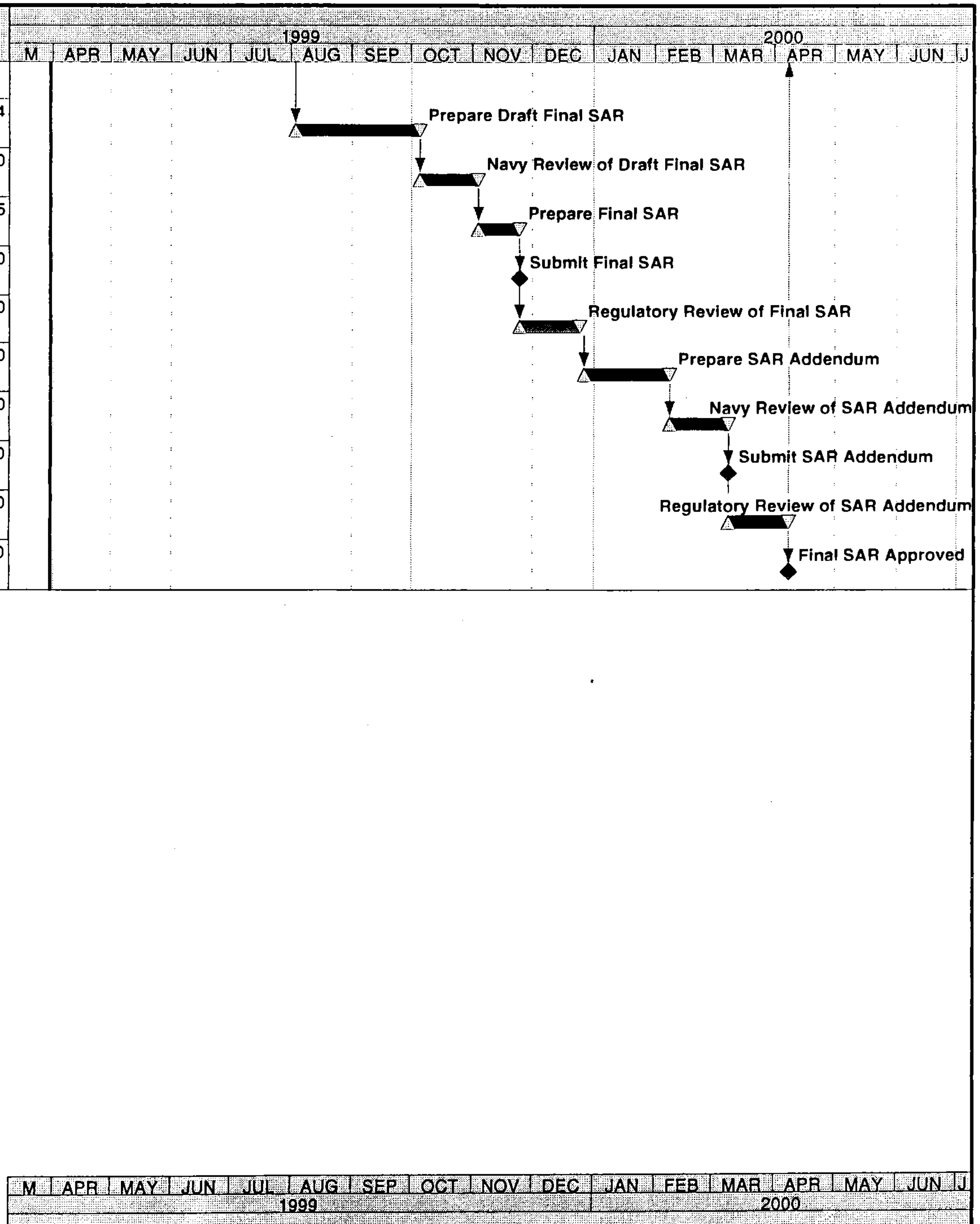
Sheet 1 of 2

NAVY - CLEAN III (SDIV)

BASELINE SCHEDULE

TetraTech NUS

Activity ID	Activity Description	Cal ID	Early start	Early finish	Orig Dur
CONTAMINATION ASSESSMENT REPORT					
EP0150305	Prepare Draft Final SAR	2	03AUG99	04OCT99	44
EP0150315	Navy Review of Draft Final SAR	1	05OCT99	03NOV99	30
EP0150320	Prepare Final SAR	2	04NOV99	24NOV99	15
EP0150325	Submit Final SAR	2		24NOV99	0
EP0150330	Regulatory Review of Final SAR	1	25NOV99	24DEC99	30
EP0150425	Prepare SAR Addendum	2	27DEC99	07FEB00	30
EP0150427	Navy Review of SAR Addendum	1	08FEB00	08MAR00	30
EP0150430	Submit SAR Addendum	1		08MAR00	0
EP0150433	Regulatory Review of SAR Addendum	1	09MAR00	07APR00	30
EP0150435	Final SAR Approved	2		07APR00	0



Project Start	31MAR99
Project Finish	08JUN00
Data Date	31MAR99
Run Date	`PR99

Early Bar
Progress Bar
Critical Activity

PORT:EP01

Sheet 2 of 2

NAVY - CLEAN III (SDIV)

BA' 'NE SCHEDULE

TetraTech NUS

REFERENCES

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APPENDIX A

TANK CLOSURE REPORT AND DISCHARGE REPORTING FORM

SOW 110

DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAS PENSACOLA
190 RADFORD BLVD
PENSACOLA, FLORIDA 32508-5217

IN REPLY REFER TO
5090
Ser 00500/333/ 1711
29 AUG 1995

Mr. W. E. Grimsley
Environmental Supervisor II
Environmental Health Services
Petroleum Tank Section
1190 West Leonard Street, Suite 2
Pensacola, FL 32501

Re: STORAGE TANK CLOSURE, FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION 62-761.800

Dear Mr. Grimsley:

The Closure Assessment Form and the Discharge Report Form, for the Underground Storage Tanks (UST) at Buildings 681 and 682 on board Naval Air Station Pensacola, are enclosed.

Both soil and groundwater sampling data is included in this closure report. All sampling data will be included with the contamination assessment report (CAR) to be submitted in the future.

Should you have any questions or require further information, please contact Mr. Dean Spencer, P.E., at (904) 452-3900.

Sincerely,

William H. Taylor, Jr.
WILLIAM H. TAYLOR, JR.
Environmental Officer
By direction of
the Commanding Officer

Encl:
(1) Closure Assessment Form
(2) Discharge Report Form
(3) Closure Assessment Report

Copy to:
SOUTHNAVFACENGCOM (Mr. B. Glover)
FDEP Pensacola (Mr. E. Ericson)
FDEP Tallahassee (Mr. E. Nuzie)

DER Form # 17-761.900(5)
Form Title Closure Assessment Form
Effective Date December 10, 1990
DER Application No. ____________
(Filled in by DER)

Florida Department of Environmental Regulation
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Closure Assessment Form

Owners of storage tank systems that are replacing, removing or closing in place storage tanks shall use this form to demonstrate that a stor system closure assesment was performed in accordance with Rule 17-761 or 17-762, Florida Administrative Code. Eligible Early Detection Inc tive (EDI) and Reimbursement Program sites do not have to perform a closure assessment.

Please Print or Type
Complete All Applicable Blanks

1. Date: July 19, 1995
2. DER Facility ID Number: 17 / 9202973 3. County: Escambia
4. Facility Name: Pensacola Naval Air Station
5. Facility Owner: United States Navy
6. Facility Address: 190 Radford Blvd, Pensacola, Fl 32508
7. Mailing Address: 190 Radford Blvd,
8. Telephone Number: (904) 452-3900 9. Facility Operator: USN
10. Are the Storage Tank(s): (Circle one or both) A. Aboveground or B. Underground
11. Type of Product(s) Stored: Diesel Fuel Marine
12. Were the Tank(s): (Circle one) A. Replaced B. Removed C. Closed in Place D. Upgraded (aboveground tanks onl
13. Number of Tanks Closed: 2 (Tank#681 & Tank#682) 14. Age of Tanks: 52 years

Facility Assessment Information

Yes	No	Not Applicable	
☐	☒		1. Is the facility participating in the Florida Petroleum Liability Insurance and Restoration Program (FPLIRP)?
☐	☐		2. Was a Discharge Reporting Form submitted to the Department? If yes, When: ____ Where: ____
☒	☐		3. Is the depth to ground water less than 20 feet?
☒	☐	☐	4. Are monitoring wells present around the storage system? If yes, specify type: ☒ Water monitoring ☐ Vapor monitoring
☐	☒	☐	5. Is there free product present in the monitoring wells or within the excavation?
☐	☐	☒	6. Were the petroleum hydrocarbon vapor levels in the soils greater than 500 parts per million for gasoline? Specify sample type: ☐ Vapor Monitoring wells ☒ Soil sample(s)
☐	☒	☐	7. Were the petroleum hydrocarbon vapor levels in the soils greater than 50 parts per million for diesel/kerosene? Specify sample type: ☐ Vapor Monitoring wells ☒ Soil sample(s)
☐	☐	☐	8. Were the analytical laboratory results of the ground water sample(s) greater than the allowable state target levels (See target levels on reverse side of this form and supply laboratory data sheets)
☐	☐	☒	9. If a used oil storage system, did a visual inspection detect any discolored soil indicating a release?
☐	☐		10. Are any potable wells located within ¼ of a mile radius of the facility?
☒	☐		11. Is there a surface water body within ¼ mile radius of the site? If yes, indicate distance: ____

DER Form #	17-761.900(6)
Form Title	Closure Assessment Form
Effective Date	December 10, 1990
DER Application No	(Filled in by DER)

12. A detailed drawing or sketch of the facility that includes the storage system location, monitoring wells, buildings, storm drains, sample locations, and dispenser locations must accompany this form.
13. If a facility has a pollutant storage tank system that has both gasoline and kerosene/diesel stored on site, both EPA Method 602 and EPA Method 610 must be performed on the ground water samples obtained.
14. Amount of soils removed and receipt of proper disposal.
15. If yes is answered to any one of questions 5-9, a Discharge Reporting Form 17-761.900(1) indicating a suspected release shall be submitted to the Department within one working day.
16. A copy of this form and any attachments must be submitted to the Department's district office in your area and to the locally administered program office under contract with the Department within 60 days of completion of tank removal or filling a tank with an inert material.

William H. Taylor Jr.

Signature of Owner

Date

Signature of Person Performing Assessment

7/19/95

Date

James A. Stidham-President-Jim Stidham & Associates, Inc.

Title of Person Performing Assessment

State Ground Water Target Levels That Affect A Pollutant Storage Tank System Closure Assessment

State ground water target levels are as follows:

1. For gasoline (EPA Method 602):
   - a. Benzene — 1 ug/l
   - b. Total VOA — 50 ug/l
     - Benzene
     - Toluene
     - Total Xylenes
     - Ethylbenzene
   - c. Methyl Test-Butyl Ether (MTBE) — 50 ug/l
2. For kerosene/diesel (EPA Method 610):
   - a. Polynuclear Aromatic Hydrocarbons (PAHS) (Best achievable detection limit, 10 ug/l maximum)

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

DER Form #	17-761.900(1)
Form Title	Discharge Reporting Form
Effective Date	December 10 1990
DER Application No.	(Filled in by DER)

Discharge Reporting Form

Use this form to notify the Department of Environmental Regulation of:

1. Results of tank tightness testing that exceed allowable tolerances within ten days of receipt of test result.
2. Petroleum discharges exceeding 25 gallons on pervious surfaces as described in Section 17-761.460 F.A.C. within one working day of discovery
3. Hazardous substance (CERCLA regulated), discharges exceeding applicable reportable quantities established in 17-761.460(2) F.A.C., within one working day of the discovery.
4. Within one working day of discovery of suspected releases confirmed by: (a) released regulated substances or pollutants discovered in the surrounding area, (b) unusual and unexplained storage system operating conditions, (c) monitoring results from a leak detection method or from a tank closure assessment that indicate a release may have occurred, or (d) manual tank gauging results for tanks of ... gallons or less, exceeding ten gallons per weekly test or five gallons averaged over four consecutive weekly tests.

Mail to the DER District Office in your area listed on the reverse side of this form

PLEASE PRINT OR TYPE
Complete all applicable blanks

1. DER Facility ID Number: 17 / 9202973 2. Tank Number: 681 & 682 3. Date: 7 / 19 / 95
4. Facility Name: Pensacola Naval Air Station
   Facility Owner or Operator: United States Navy
   Facility Address: 190 Radford Blvd. Pensacola, Fl 32508
   Telephone Number: (904) 452-3900 County: Escambia
   Mailing Address: 190 Radford Blvd. Pensacöla, Fl 32508
5. Date of receipt of test results or discovery: July 5, 1995 7 / 5 / 95 month/day/year
6. Method of initial discovery. (circle one only)
   A. Liquid detector (automatic or manual)
   B. Vapor detector (automatic or manual)
   C. Tightness test (underground tanks only).
   D. Emptying and Inspection.
   E. Inventory control.
   F. Vapor or visible signs of a discharge in the vicinity.
   G. Closure: Monitor Well (explain)
   H. Other:
7. Estimated number of gallons discharged: Unknown
8. What part of storage system has leaked? (circle all that apply) A. Dispenser B. Pipe C. Fitting D. Tank E. Unknown
9. Type of regulated substance discharged. (circle one)
   A. leaded gasoline
   B. unleaded gasoline
   C. gasohol
   D. vehicular diesel
   F. aviation gas
   G. jet fuel
   L. used/waste oil
   M. diesel
   O. new/lube oil
   V. hazardous substance includes pesticides, ammonia, chlorine and derivatives (write in name or Chemical Abstract Service CAS number)
   Z. other (write in name)
10. Cause of leak. (circle all that apply)
   A. Unknown
   B. Split
   C. Loose connection
   D. Corrosion
   E. Puncture
   F. Installation failure
   G. Spill
   H. Overfill
   I. Other (specify)
11. Type of financial responsibility. (circle one)
   A. Third party insurance provided by the state insurance contractor
   B. Self-insurance pursuant to Chapter 17-769.500 F.A.C.
   C. Not applicable
   D. None
12. To the best of my knowledge and belief all information submitted on this form is true, accurate, and complete.

William H. Taylor, Jr.
Printed Name of Owner, Operator or Authorized Representative

William H. Taylor Jr.
Signature of Owner, Operator or Authorized Representative

TANK CLOSURE ASSESSMENT REPORT

PENSACOLA NAVAL AIR STATION
PENSACOLA, FLORIDA

FACILITY I.D. #179202973
TANK #681 AND TANK #682

PREPARED FOR:

ESCAMBIA COUNTY PUBLIC HEALTH UNIT
1190 WEST LEONARD STREET, SUITE 2
PENSACOLA, FLORIDA 32501

PREPARED BY:

JIM STIDHAM & ASSOCIATES, INC.
POST OFFICE BOX 13861
TALLAHASSEE, FLORIDA 32317-3861

CLOSURE ASSESSMENT REPORT
PENSACOLA NAVAL AIR STATION
FACILITY ID # 179202973

INTRODUCTION

On April 6, 1995 Jim Stidham & Associates, Inc. (JSA) began performance of closure assessment on two underground storage tanks (USTs). The tanks are located south of Farrar Street, Pensacola Naval Air Station, Pensacola, Florida 32508 (Figure 1). These tanks were taken out of service and closed in place by Phoenix Construction Services and Environmental Recovery, Inc.

JSA visited the site on April 6, 1995 and met with Jim Checkovich and Terry Wilson of Phoenix Construction Services to discuss the tank closure assessment for tank #681 and tank #682 at the above mentioned facility. The following summarizes the work which occurred at this facility as a part of this Tank Closure Assessment Report.

SITE HISTORY

The petroleum storage facility consisting of tank #681 and tank #682 contains two tanks that are each 102.5 feet in diameter and 21 feet in depth. Each tank has an approximate volume of 1.102 million gallons. The contents of each of these tanks consisted of diesel fuel marine (DFM). These tanks were installed in December, 1943.

Florida Department of Environmental Protection's
Stationary Tank Registration

Tank #	Gallons	Contents	Year Installed
681	1,102,000	Diesel Fuel Marine	12/43
682	1,102,000	Diesel Fuel Marine	12/43

TANK CLOSURE ASSESSMENT (TCA)

Beginning on April 6, 1995 and concluding on June 29, 1995, JSA performed tank closure assessments for tank #681 and tank #682.

The threshold for excessively contaminated soil was set at 50 parts per million (ppm) following Chapter 62-770.200(2) for diesel contaminated sources. The Closure Assessment Form is included in Appendix A.

The initial phase of the Tank Closure assessment was performed by JSA on April 6 and April 7, 1995. This assessment consisted of installing soil borings on the tops of each tank in question to determine the status of the soil. Soil samples were collected on a twenty foot interval basis in a grid pattern that encompassed the area above each tank (Figure 2). At each soil boring location, a sample was collected for analysis at intervals of one foot and four foot below land surface (Table 1 and Table 2). Upon determining the soil was free from contamination, JSA contacted Terry Wilson of Phoenix Construction so that the in place tank closure could incorporate this soil as part of the material used to fill in the tank areas.

On April 25 and April 26, 1995 JSA performed the second phase of the Tank Closure Assessment. This phase consisted of installing soil borings around tank #681 and tank #682. These soil borings were located at 40 foot intervals around each tank as part of the closure assessment (Figure 3). The depths of each of these soil borings were 18 feet below land surface. Soil samples were collected for analysis at three foot intervals in each soil boring (Table 3 and Table 4).

In addition to the above mentioned soil borings, JSA also performed soil borings along the product lines between tank #681 and tank #682. These soil borings (Table 5) were located at 20 foot intervals (Figure 3) and were installed to ten feet so as to encompass the soil below the product lines.

The soil collected for analysis was scanned with a Foxboro Century 128, organic vapor analyzer (OVA). This instrument is a flame ionization detector (FID) used to conduct field analysis of soil samples. Standard manufacturers operating procedures were followed and all field calibrations were made according to manufacturer's recommendations.

The soil samples were sealed in half-filled 16 ounce glass jars and the OVA readings were taken in the headspace above the soil as recommended by FDEP's Guidelines for Assessments and Remediation of Petroleum Contaminated Soils and in accordance with Florida Administrative Code (FAC) Chapter 62-770.200(2). Duplicate soil samples were collected from each test site so that samples could be analyzed for total biogenic content using a carbon filter attachment. Total Volatile Hydrocarbons (TVH) were then determined by subtracting the biogenic reading from the OVA reading.

The final phase of this Tank Closure Assessment was performed on June 29, 1995 when JSA installed four temporary monitoring wells around tank #681 and tank #682 (Figure 3). The placement of these temporary monitoring wells was restricted by several factors that limited access of the drill rig. The site immediately around tank #681 and tank #682 possesses a great deal of sand and large trees that limited the mobility of the drill rig. TW-1 and TW-2 were placed around tank #682 as close to opposite each other as conditions would allow. The ideal location for TW-3 is in the vicinity of soil boring 20 (SB-20); however, sloping topography and some large oak trees required TW-3 to be located in an alternate area. The current location to the south of the proposed well was chosen because this area is downgradient (Figure 3). TW-4 was installed opposite MW-100, an on-site existing monitoring well. The temporary wells were installed for the purpose of obtaining a groundwater sample for analysis from the surficial aquifer. The soil from each of these temporary monitoring wells were collected for OVA analysis at five foot intervals below land surface (Table 6).

Groundwater samples were collected from each of the four temporary monitoring wells (TW-1, TW-2, TW-3, and TW-4) and also from an on-site existing monitoring well (MW-100). The locations of the existing monitoring well and the temporary monitoring wells are shown in Figure 3. Groundwater samples were collected for EPA methods 602 and 610 and were shipped to Environmental Conservation Laboratory (ENCO) for analysis.

Excessive levels of contamination were encountered in the groundwater sample from the temporary monitoring well four (TW-4) located at the south side of tank #681 (Figure 3). The remaining three temporary wells (TW-1, TW-2, and TW-3) and the on-site existing monitoring well (MW-100) do not indicate presence of any Diesel Fuel Marine constituents. A Discharge Reporting Form (Appendix B) was submitted on July 20, 1995 to Dean Spencer of the Department of the Navy for review and submittal. This form will then be sent to Escambia County Public Health Unit. The laboratory results of this analysis are included in Appendix C and a summary of the analytical results are displayed in Table A below.

TABLE A

PARAMETER	TW-1 (ug/L)	TW-2 (ug/L)	TW-3 (ug/L)	TW-4 (ug/L)	MW-100 (ug/L)	FDEP TARGET LEVELS (ug/L)
BENZENE	<1	<1	<1	2	<1	1.0
TOLUENE	<1	<1	<1	5	<1	
ETHYLBENZENE	<1	<1	<1	81	<1	
XYLENE	<1	<1	<1	148	<1	
TOTAL BTEX	<1	<1	<1	236	<1	50
MTBE	<1	<1	<1	<1	<1	50
NAPTHALENE	<1	<1	<1	<1	<1	100

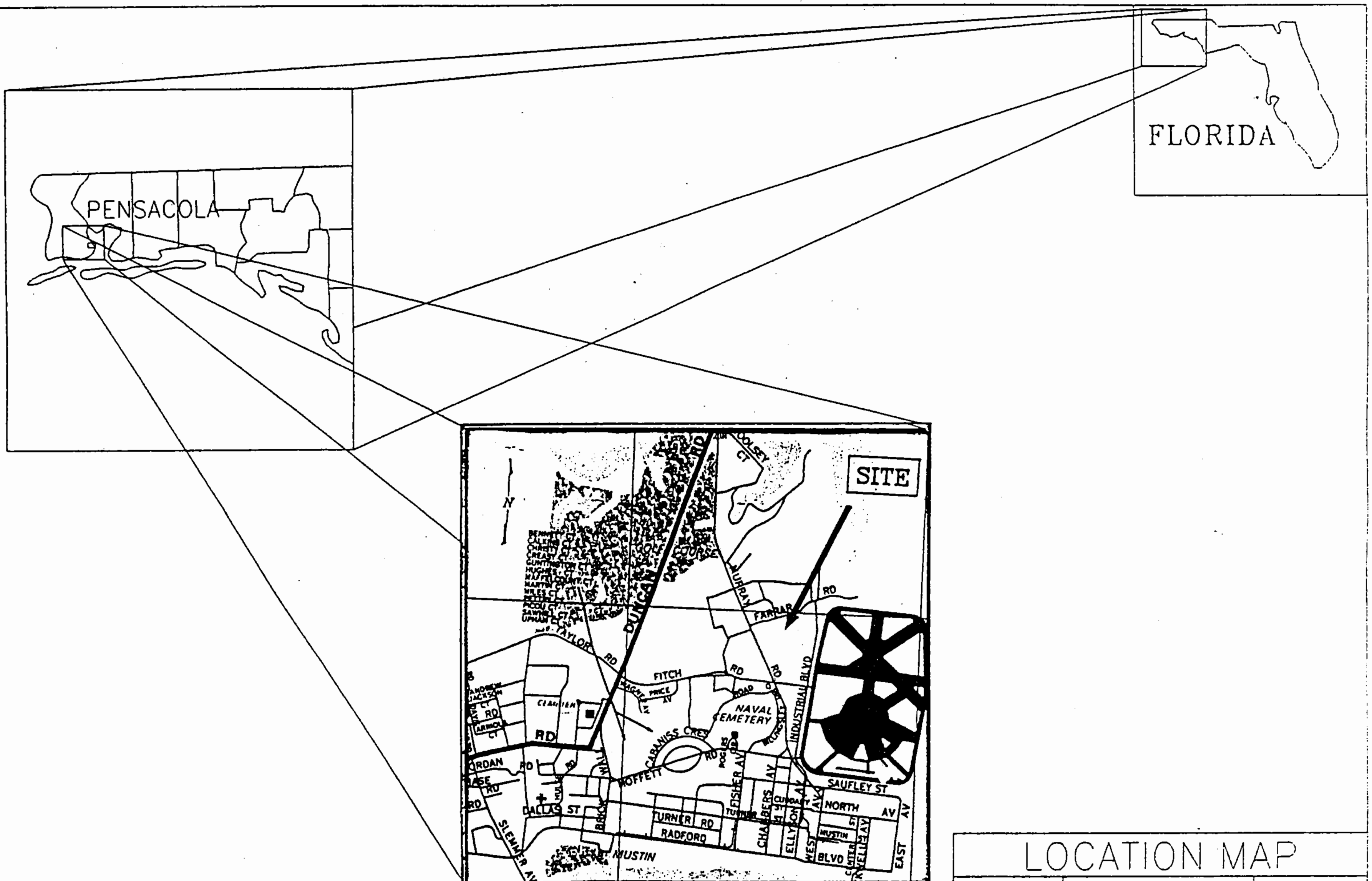
(Photographs of the site are located in Appendix D)

SUMMARY

During Tank Closure Assessment activities of tank #681 and tank #682 JSA installed seventy-two soil borings in the soil located above each tank. JSA also installed 24 soil borings around the two tanks and the related product lines as part of the Tank Closure Assessment. Four temporary monitoring wells were also installed and sampled, and an existing on-site monitoring well was sampled as part of this assessment. Groundwater samples from three of the temporary monitoring wells and the existing on-site monitoring well revealed no Diesel Fuel Marine constituents.

Temporary Monitoring Well Four (TW-4), however, revealed levels of groundwater contamination greater than FDEP target levels and a Discharge Reporting Form was prepared for submittal. After reviewing the site history with base employees it was brought to JSA's attention that a condensate line from tank #681 was repaired several years ago. This condensate line collected moisture that accumulated around the tank heater while in operation. The line was repaired and the system placed back into service.

FIGURES



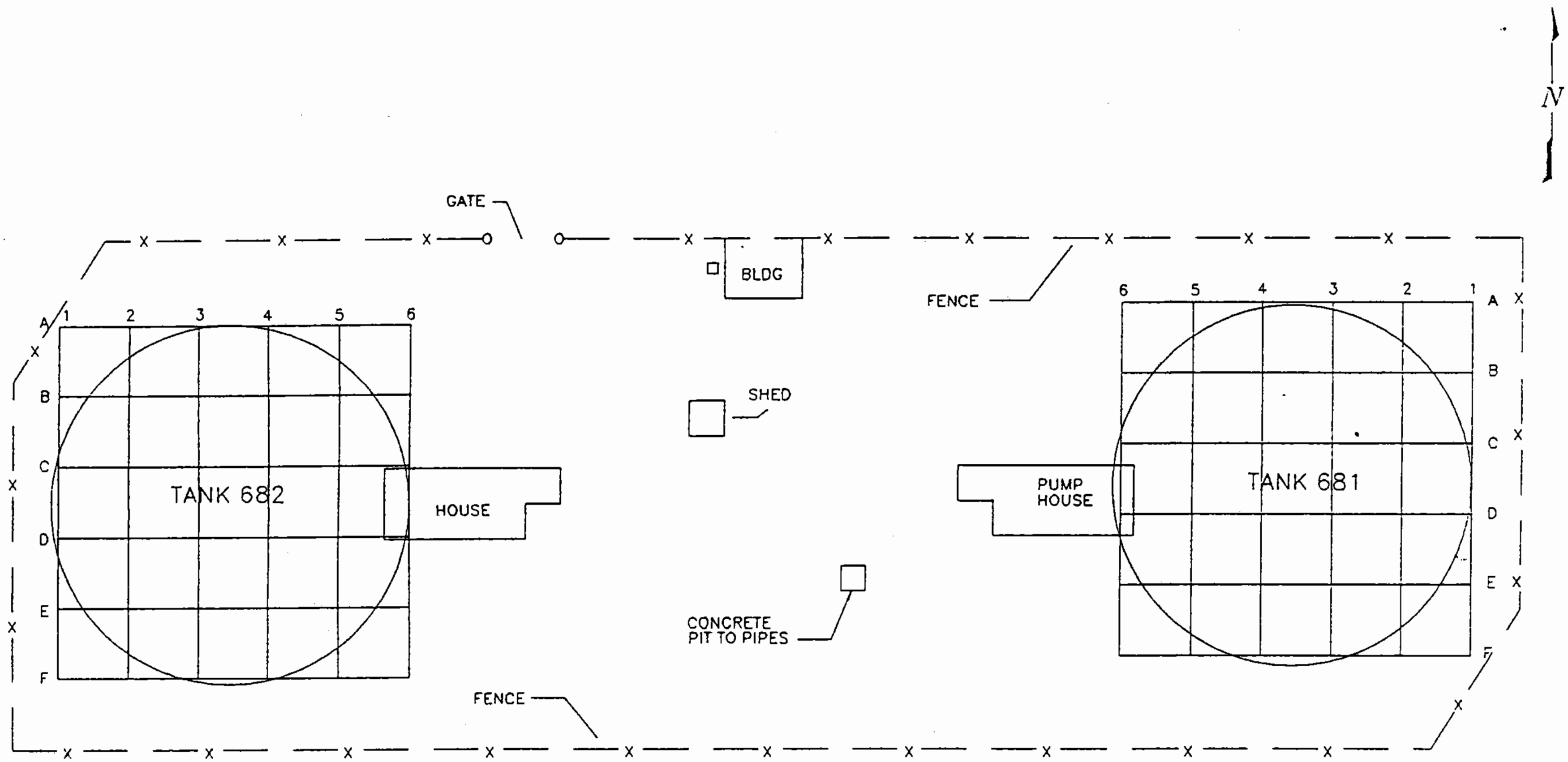
LOCATION MAP

SCALE: NONE	FIGURE 1	DRAWN BY: PK
DATE: 7/18/95		REVISED:

JIM STIDHAM & ASSOCIATES, INC.
TALLAHASSEE, FLORIDA

PENSACOLA NAVAL AIR STATION
PENSACOLA, FLORIDA

DRAWING NO.: A-NASLOC



TOP OF TANK SOIL BORING DIAGRAM

SCALE: 1" = 50'

DATE: 5 / 31 / 95

FIGURE 2

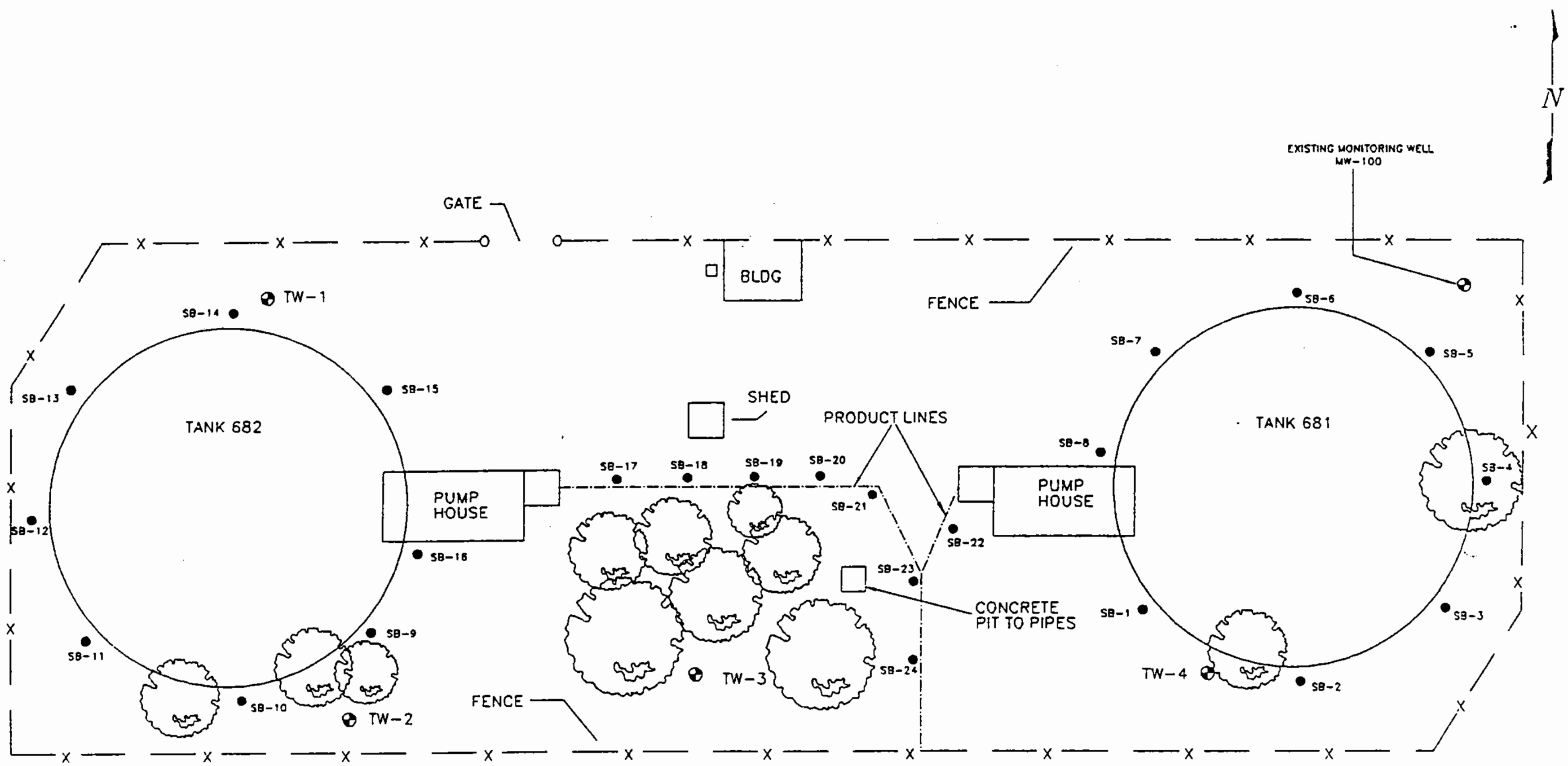
DRAWN BY: PH

REVISED: RK

JIM STIDHAM & ASSOCIATES, INC.
TALLAHASSEE, FLORIDA

PENSACOLA NAVAL AIR STATION
PENSACOLA, FLORIDA

DRAWING NO.: A:NASPENSB1



LEGEND

TW-1	TEMPORARY MONITORING WELL
MW-100	MONITORING WELL
SB-1	SOIL BORING
— - — - —	PRODUCT LINE
	OAK TREE

SITE DIAGRAM

FIGURE 3

SCALE: 1" = 50'
DATE: 5 / 31 / 95
DRAWN BY: PH
REVISED: PK

JIM STIDHAM & ASSOCIATES, INC.
TALLAHASSEE, FLORIDA

PENSACOLA NAVAL AIR STATION
PENSACOLA, FLORIDA

DRAWING NO.: A:SITO1A

TABLES

PENSACOLA NAVAL AIR STATION
FDEP FACILITY ID # 179202973
PENSACOLA NAS: TOP OF TANK #681

TABLE 1

SOIL BORING ID	DEPTH (FT)	OVA (PPM)	BIO (PPM)	TVH (PPM)	SOIL DESCRIPTION
A-1	1'	<1	<1	<1	TAN SAND
A-1	4'	<1	<1	<1	TAN SAND
A-2	1'	<1	<1	<1	WHITE SAND
A-2	4'	<1	<1	<1	TAN SAND
A-3	1'	<1	<1	<1	TAN SAND
A-3	4'	<1	<1	<1	WHITE SAND
A-4	1'	<1	<1	<1	TAN SAND
A-4	4'	<1	<1	<1	TAN SAND
A-5	1'	<1	<1	<1	BROWN SAND
A-5	4'	<1	<1	<1	BROWN SAND
A-6	1'	<1	<1	<1	TAN SAND
A-6	4'	<1	<1	<1	TAN SAND
B-1	1'	<1	<1	<1	WHITE SAND
B-1	4'	<1	<1	<1	WHITE SAND
B-2	1'	<1	<1	<1	BROWN SAND
B-2	4'	<1	<1	<1	WHITE SAND
B-3	1'	<1	<1	<1	TAN SAND
B-3	4'	<1	<1	<1	TAN SAND
B-4	1'	<1	<1	<1	TAN SAND
B-4	4'	<1	<1	<1	TAN SAND
B-5	1'	<1	<1	<1	TAN SAND
B-5	4'	<1	<1	<1	TAN SAND
B-6	1'	<1	<1	<1	TAN SAND
B-6	4'	<1	<1	<1	TAN SAND
C-1	1'	<1	<1	<1	WHITE SAND
C-1	4'	<1	<1	<1	WHITE SAND
C-2	1'	<1	<1	<1	TAN SAND
C-2	4'	<1	<1	<1	TAN SAND
C-3	1'	<1	<1	<1	BROWN SAND
C-3	4'	<1	<1	<1	BROWN SAND
C-4	1'	<1	<1	<1	BROWN SAND
C-4	4'	<1	<1	<1	BROWN SAND
C-5	1'	<1	<1	<1	BROWN SAND
C-5	4'	<1	<1	<1	BROWN SAND
C-6	1'	<1	<1	<1	TAN SAND
C-6	4'	<1	<1	<1	BROWN SAND

OVA: ORGANIC VOLATILE ANALYZER
BIO: BIOGENIC READING
TVH: TOTAL VOLATILE HYDROCARBONS
PPM: PARTS PER MILLION

PENSACOLA NAVAL AIR STATION
FDEP FACILITY ID # 179202973
PENSACOLA NAS: TOP OF TANK #681

TABLE 1 (CONT.)

SOIL BORING I	DEPTH (FT	OVA (PPM)	BIO (PPM)	TVH (PPM)	SOIL DESCRIPTION
D-1	1'	<1	<1	<1	WHITE SAND
D-1	4'	<1	<1	<1	WHITE SAND
D-2	1'	<1	<1	<1	BROWN SAND
D-2	4'	<1	<1	<1	BROWN SAND
D-3	1'	<1	<1	<1	BROWN SAND
D-3	4'	<1	<1	<1	BROWN SAND
D-4	1'	<1	<1	<1	TAN SAND
D-4	4'	<1	<1	<1	TAN SAND
D-5	1'	<1	<1	<1	TAN SAND
D-5	4'	<1	<1	<1	TAN SAND
D-6	1'	<1	<1	<1	TAN SAND
D-6	4'	<1	<1	<1	TAN SAND
E-1	1'	<1	<1	<1	TAN SAND
E-1	4'	<1	<1	<1	WHITE SAND
E-2	1'	<1	<1	<1	WHITE SAND
E-2	4'	<1	<1	<1	WHITE SAND
E-3	1'	<1	<1	<1	WHITE SAND
E-3	4'	<1	<1	<1	WHITE SAND
E-4	1'	<1	<1	<1	WHITE SAND
E-4	4'	<1	<1	<1	TAN SAND
E-5	1'	<1	<1	<1	WHITE SAND
E-5	4'	<1	<1	<1	WHITE SAND
E-6	1'	<1	<1	<1	WHITE SAND
E-6	4'	<1	<1	<1	TAN SAND
F-1	1'	<1	<1	<1	TAN SAND
F-1	4'	<1	<1	<1	WHITE SAND
F-2	1'	<1	<1	<1	TAN SAND
F-2	4'	<1	<1	<1	WHITE SAND
F-3	1'	<1	<1	<1	WHITE SAND
F-3	2.5'	<1	<1	<1	WHITE SAND
F-4	1'	<1	<1	<1	WHITE SAND
F-4	2'	<1	<1	<1	WHITE SAND
F-5	1'	<1	<1	<1	WHITE SAND
F-5	4'	<1	<1	<1	WHITE SAND
F-6	1'	<1	<1	<1	WHITE SAND
F-6	4'	<1	<1	<1	TAN SAND

OVA: ORGANIC VOLATILE ANALYZER
BIO: BIOGENIC READING
TVH: TOTAL VOLATILE HYDROCARBONS
PPM: PARTS PER MILLION

PENSACOLA NAVAL AIR STATION
FDEP FACILITY ID # 179202973
PENSACOLA NAS: TOP OF TANK #682

TABLE 2

SOIL BORING ID	DEPTH (FT)	OVA (PPM)	BIO (PPM)	TVH (PPM)	SOIL DESCRIPTION
A-1	1'	<1	<1	<1	TAN SAND
A-1	4'	<1	<1	<1	TAN SAND
A-2	1'	<1	<1	<1	BROWN SAND
A-2	4'	<1	<1	<1	TAN SAND
A-3	1'	<1	<1	<1	WHITE SAND
A-3	4'	<1	<1	<1	TAN SAND
A-4	1'	<1	<1	<1	WHITE SAND
A-4	4'	<1	<1	<1	TAN SAND
A-5	1'	<1	<1	<1	TAN SAND
A-5	4'	<1	<1	<1	TAN SAND
A-6	1'	<1	<1	<1	TAN SAND
A-6	4'	<1	<1	<1	TAN SAND
B-1	1'	<1	<1	<1	WHITE SAND
B-1	4'	<1	<1	<1	WHITE SAND
B-2	1'	<1	<1	<1	TAN SAND
B-2	4'	<1	<1	<1	TAN SAND
B-3	1'	<1	<1	<1	WHITE SAND
B-3	4'	<1	<1	<1	WHITE SAND
B-4	1'	<1	<1	<1	WHITE SAND
B-4	4'	<1	<1	<1	WHITE SAND
B-5	1'	<1	<1	<1	WHITE SAND
B-5	4'	<1	<1	<1	WHITE SAND
B-6	1'	<1	<1	<1	WHITE SAND
B-6	4'	<1	<1	<1	TAN SAND
C-1	1'	<1	<1	<1	WHITE SAND
C-1	4'	<1	<1	<1	WHITE SAND
C-2	1'	<1	<1	<1	WHITE SAND
C-2	4'	<1	<1	<1	WHITE SAND
C-3	1'	<1	<1	<1	WHITE SAND
C-3	4'	<1	<1	<1	TAN SAND
C-4	1'	<1	<1	<1	WHITE SAND
C-4	4'	<1	<1	<1	WHITE SAND
C-5	1'	<1	<1	<1	TAN SAND
C-5	4'	<1	<1	<1	TAN SAND
C-6	1'	<1	<1	<1	WHITE SAND
C-6	4'	<1	<1	<1	WHITE SAND

OVA: ORGANIC VOLATILE ANALYZER
BIO: BIOGENIC READING
TVH: TOTAL VOLATILE HYDROCARBONS
PPM: PARTS PER MILLION

PENSACOLA NAVAL AIR STATION
FDEP FACILITY ID # 179202973
PENSACOLA NAS: TOP OF TANK #682

TABLE 2 (CONT.)

SOIL BORING I	DEPTH (FT	OVA (PPM)	BIO (PPM)	TVH (PPM)	SOIL DESCRIPTION
D-1	1'	<1	<1	<1	WHITE SAND
D-1	4'	<1	<1	<1	TAN SAND
D-2	1'	<1	<1	<1	WHITE SAND
D-2	4'	<1	<1	<1	WHITE SAND
D-3	1'	<1	<1	<1	WHITE SAND
D-3	4'	<1	<1	<1	WHITE SAND
D-4	1'	<1	<1	<1	WHITE SAND
D-4	4'	<1	<1	<1	WHITE SAND
D-5	1'	<1	<1	<1	WHITE SAND
D-5	4'	<1	<1	<1	WHITE SAND
D-6	1'	<1	<1	<1	WHITE SAND
D-6	4'	<1	<1	<1	WHITE SAND
E-1	1'	<1	<1	<1	WHITE SAND
E-1	4'	<1	<1	<1	WHITE SAND
E-2	1'	<1	<1	<1	TAN SAND
E-2	4'	<1	<1	<1	TAN SAND
E-3	1'	<1	<1	<1	WHITE SAND
E-3	4'	<1	<1	<1	WHITE SAND
E-4	1'	<1	<1	<1	WHITE SAND
E-4	4'	<1	<1	<1	TAN SAND
E-5	1'	<1	<1	<1	WHITE SAND
E-5	4'	<1	<1	<1	WHITE SAND
E-6	1'	<1	<1	<1	WHITE SAND
E-6	4'	<1	<1	<1	WHITE SAND
F-1	1'	<1	<1	<1	WHITE SAND
F-1	4'	<1	<1	<1	WHITE SAND
F-2	1'	<1	<1	<1	WHITE SAND
F-2	4'	<1	<1	<1	WHITE SAND
F-3	1'	<1	<1	<1	WHITE SAND
F-3	4'	<1	<1	<1	WHITE SAND
F-4	1'	<1	<1	<1	WHITE SAND
F-4	2'	<1	<1	<1	WHITE SAND
F-5	1'	<1	<1	<1	WHITE SAND
F-5	4'	<1	<1	<1	WHITE SAND
F-6	1'	<1	<1	<1	WHITE SAND
F-6	4'	<1	<1	<1	WHITE SAND

OVA: ORGANIC VOLATILE ANALYZER
BIO: BIOGENIC READING
TVH: TOTAL VOLATILE HYDROCARBONS
PPM: PARTS PER MILLION

PENSACOLA NAVAL AIR STATION
FDEP FACILITY ID # 179202973
PENSACOLA NAS TANK #681

TABLE 3

SOIL BORING ID	DEPTH (FT)	OVA (PPM)	BIO (PPM)	TVH (PPM)	SOIL DESCRIPTION
SB-1	1'	<1	<1	<1	WHITE SAND
SB-1	4'	<1	<1	<1	WHITE SAND
SB-1	7'	<1	<1	<1	TAN SAND
SB-1	10'	<1	<1	<1	TAN SAND
SB-1	13'	<1	<1	<1	WHITE SAND
SB-1	16'	<1	<1	<1	WHITE SAND
SB-1	18'	<1	<1	<1	WHITE SAND
SB-2	1'	<1	<1	<1	WHITE SAND
SB-2	4'	<1	<1	<1	WHITE SAND
SB-2	7'	<1	<1	<1	TAN SAND
SB-2	10'	<1	<1	<1	TAN SAND
SB-2	13'	<1	<1	<1	TAN SAND
SB-2	16'	<1	<1	<1	TAN SAND
SB-2	18'	<1	<1	<1	TAN SAND
SB-3	1'	<1	<1	<1	WHITE SAND
SB-3	4'	<1	<1	<1	TAN SAND
SB-3	7'	<1	<1	<1	TAN SAND
SB-3	10'	<1	<1	<1	TAN SAND
SB-3	13'	<1	<1	<1	TAN SAND
SB-3	16'	<1	<1	<1	TAN SAND
SB-3	18'	<1	<1	<1	TAN SAND
SB-4	1'	<1	<1	<1	WHITE SAND
SB-4	4'	<1	<1	<1	WHITE SAND
SB-4	7'	<1	<1	<1	TAN SAND
SB-4	10'	<1	<1	<1	TAN SAND
SB-4	13'	<1	<1	<1	TAN SAND
SB-4	16'	<1	<1	<1	TAN SAND
SB-4	18'	<1	<1	<1	TAN SAND

OVA: ORGANIC VOLATILE ANALYZER
BIO: BIOGENIC READING
TVH: TOTAL VOLATILE HYDROCARBONS
PPM: PARTS PER MILLION

PENSACOLA NAVAL AIR STATION
FDEP FACILITY ID # 179202973
PENSACOLA NAS TANK #681

TABLE 3 (CONT.)

SOIL BORING ID	DEPTH (FT)	OVA (PPM)	BIO (PPM)	TVH (PPM)	SOIL DESCRIPTION
SB-5	1'	<1	<1	<1	WHITE SAND
SB-5	4'	<1	<1	<1	TAN SAND
SB-5	7'	<1	<1	<1	TAN SAND
SB-5	10'	<1	<1	<1	TAN SAND
SB-5	13'	<1	<1	<1	WHITE SAND
SB-5	16'	<1	<1	<1	WHITE SAND
SB-5	18'	<1	<1	<1	WHITE SAND
SB-6	1'	<1	<1	<1	TAN SAND
SB-6	4'	<1	<1	<1	TAN SAND
SB-6	7'	<1	<1	<1	TAN SAND
SB-6	10'	<1	<1	<1	WHITE SAND
SB-6	13'	<1	<1	<1	WHITE SAND
SB-6	16'	<1	<1	<1	WHITE SAND
SB-6	18'	<1	<1	<1	WHITE SAND
SB-7	1'	<1	<1	<1	TAN SAND
SB-7	4'	<1	<1	<1	TAN SAND
SB-7	7'	<1	<1	<1	TAN SAND
SB-7	10'	<1	<1	<1	TAN SAND
SB-7	13'	<1	<1	<1	TAN SAND
SB-7	16'	<1	<1	<1	WHITE SAND
SB-7	18'	<1	<1	<1	WHITE SAND
SB-8	1'	<1	<1	<1	TAN SAND
SB-8	4'	<1	<1	<1	TAN SAND
SB-8	7'	<1	<1	<1	TAN SAND
SB-8	10'	<1	<1	<1	TAN SAND
SB-8	13'	<1	<1	<1	TAN SAND
SB-8	16'	<1	<1	<1	TAN SAND
SB-8	18'	<1	<1	<1	TAN SAND

OVA: ORGANIC VOLATILE ANALYZER
BIO: BIOGENIC READING
TVH: TOTAL VOLATILE HYDROCARBONS
PPM: PARTS PER MILLION

PENSACOLA NAVAL AIR STATION
FDEP FACILITY ID # 179202973
PENSACOLA NAS TANK #682

TABLE 4

SOIL BORING ID	DEPTH (FT)	OVA (PPM)	BIO (PPM)	TVH (PPM)	SOIL DESCRIPTION
SB-9	1'	<1	<1	<1	WHITE SAND
SB-9	4'	<1	<1	<1	TAN SAND
SB-9	7'	<1	<1	<1	TAN SAND
SB-9	10'	<1	<1	<1	TAN SAND
SB-9	13'	<1	<1	<1	TAN SAND
SB-9	16'	<1	<1	<1	TAN SAND
SB-9	18'	<1	<1	<1	TAN SAND
SB-10	1'	<1	<1	<1	WHITE SAND
SB-10	4'	<1	<1	<1	TAN SAND
SB-10	7'	<1	<1	<1	WHITE SAND
SB-10	10'	<1	<1	<1	WHITE SAND
SB-10	13'	<1	<1	<1	WHITE SAND
SB-10	16'	<1	<1	<1	WHITE SAND
SB-10	18'	<1	<1	<1	WHITE SAND
SB-11	1'	<1	<1	<1	TAN SAND
SB-11	4'	<1	<1	<1	TAN SAND
SB-11	7'	<1	<1	<1	TAN SAND
SB-11	10'	<1	<1	<1	TAN SAND
SB-11	13'	<1	<1	<1	TAN SAND
SB-11	16'	<1	<1	<1	TAN SAND
SB-11	18'	<1	<1	<1	TAN SAND
SB-12	1'	<1	<1	<1	WHITE SAND
SB-12	4'	<1	<1	<1	WHITE SAND
SB-12	7'	<1	<1	<1	WHITE SAND
SB-12	10'	<1	<1	<1	WHITE SAND
SB-12	13'	<1	<1	<1	WHITE SAND
SB-12	16'	<1	<1	<1	WHITE SAND
SB-12	18'	<1	<1	<1	TAN SAND

OVA: ORGANIC VOLATILE ANALYZER
BIO: BIOGENIC READING
TVH: TOTAL VOLATILE HYDROCARBONS
PPM: PARTS PER MILLION

PENSACOLA NAVAL AIR STATION
FDEP FACILITY ID # 179202973
PENSACOLA NAS TANK #682

TABLE 4 (CONT)

SOIL BORING ID	DEPTH (FT)	OVA (PPM)	BIO (PPM)	TVH (PPM)	SOIL DESCRIPTION
SB-13	1'	<1	<1	<1	TAN SAND
SB-13	4'	<1	<1	<1	TAN SAND
SB-13	7'	<1	<1	<1	TAN SAND
SB-13	10'	<1	<1	<1	TAN SAND
SB-13	13'	<1	<1	<1	TAN SAND
SB-13	16'	<1	<1	<1	TAN SAND
SB-13	18'	<1	<1	<1	TAN SAND
SB-14	1'	<1	<1	<1	TAN SAND
SB-14	4'	<1	<1	<1	TAN SAND
SB-14	7'	<1	<1	<1	TAN SAND
SB-14	10'	<1	<1	<1	TAN SAND
SB-14	13'	<1	<1	<1	TAN SAND
SB-14	16'	<1	<1	<1	TAN SAND
SB-14	18'	<1	<1	<1	BROWN SAND
BS-15	1'	<1	<1	<1	WHITE SAND
BS-15	4'	<1	<1	<1	WHITE SAND
BS-15	7'	<1	<1	<1	TAN SAND
BS-15	10'	<1	<1	<1	TAN SAND
BS-15	13'	<1	<1	<1	TAN SAND
BS-15	16'	<1	<1	<1	TAN SAND
BS-15	18'	<1	<1	<1	TAN SAND
SB-16	1'	<1	<1	<1	WHITE SAND
SB-16	4'	<1	<1	<1	WHITE SAND
SB-16	7'	<1	<1	<1	TAN SAND
SB-16	10'	<1	<1	<1	TAN SAND
SB-16	13'	<1	<1	<1	TAN SAND
SB-16	16'	<1	<1	<1	TAN SAND
SB-16	18'	<1	<1	<1	TAN SAND

OVA: ORGANIC VOLATILE ANALYZER
BIO: BIOGENIC READING
TVH: TOTAL VOLATILE HYDROCARBONS
PPM: PARTS PER MILLION

PENSACOLA NAVAL AIR STATION
FDEP FACILITY ID # 179202973
PENSACOLA NAS: PRODUCT LINES TO TANK #681 AND TANK #682

TABLE 5

SOIL BORING ID	DEPTH (FT)	OVA (PPM)	BIO (PPM)	TVH (PPM)	SOIL DESCRIPTION
SB-17	1'	<1	<1	<1	TAN SAND
SB-17	4'	<1	<1	<1	TAN SAND
SB-17	7'	<1	<1	<1	TAN SAND
SB-17	10'	<1	<1	<1	TAN SAND
SB-18	1'	<1	<1	<1	TAN SAND
SB-18	4'	<1	<1	<1	TAN SAND
SB-18	7'	<1	<1	<1	TAN SAND
SB-18	10'	<1	<1	<1	TAN SAND
SB-19	1'	<1	<1	<1	TAN SAND
SB-19	4'	<1	<1	<1	TAN SAND
SB-19	7'	<1	<1	<1	TAN SAND
SB-19	10'	<1	<1	<1	TAN SAND
SB-20	1'	<1	<1	<1	TAN SAND
SB-20	4'	<1	<1	<1	WHITE SAND
SB-20	7'	<1	<1	<1	TAN SAND
SB-20	10'	<1	<1	<1	TAN SAND
SB-21	1'	<1	<1	<1	TAN SAND
SB-21	4'	<1	<1	<1	WHITE SAND
SB-21	7'	<1	<1	<1	TAN SAND
SB-21	10'	<1	<1	<1	TAN SAND
SB-22	1'	<1	<1	<1	TAN SAND
SB-22	4'	<1	<1	<1	WHITE SAND
SB-22	7'	<1	<1	<1	WHITE SAND
SB-22	10'	<1	<1	<1	WHITE SAND
SB-23	1'	<1	<1	<1	TAN SAND
SB-23	4'	<1	<1	<1	TAN SAND
SB-23	7'	<1	<1	<1	TAN SAND
SB-23	10'	<1	<1	<1	TAN SAND
SB-24	1'	<1	<1	<1	TAN SAND
SB-24	4'	<1	<1	<1	TAN SAND
SB-24	7'	<1	<1	<1	TAN SAND
SB-24	10'	<1	<1	<1	TAN SAND

OVA: ORGANIC VOLATILE ANALYZER
BIO: BIOGENIC READING
TVH: TOTAL VOLATILE HYDROCARBONS
PPM: PARTS PER MILLION

PENSACOLA NAVAL AIR STATION
FDEP FACILITY ID # 179202973
PENSACOLA NAS: TEMPORARY WELL LOGS

TABLE 6

TEMPORARY WELL #	DEPTH (FT)	OVA (PPM)	BIO (PPM)	TVH (PPM)	SOIL DESCRIPTION
TW-1	5'	<1	<1	<1	BLACK SAND
TW-1	10'	<1	<1	<1	DARK GREY SAND
TW-1	15'	<1	<1	<1	DARK GREY SAND
TW-1	20'	<1	<1	<1	TAN SAND
TW-1	25'	<1	<1	<1	LIGHT GREY SAND (DAMP)
TW-1	30'	<1	<1	<1	LIGHT GREY SAND (WET)
TW-2	5'	<1	<1	<1	BROWN SAND
TW-2	10'	<1	<1	<1	BROWN SAND
TW-2	15'	<1	<1	<1	TAN SAND
TW-2	20'	2.8	<1	2.8	WHITE SAND (DAMP)
TW-2	25'	1.4	<1	1.4	WHITE SAND (WET)
TW-3	5'	<1	<1	<1	BROWN SAND
TW-3	10'	<1	<1	<1	TAN SAND
TW-3	15'	<1	<1	<1	TAN SAND
TW-3	20'	<1	<1	<1	WHITE SAND (DAMP)
TW-3	25'	<1	<1	<1	WHTIE SAND (WET)
TW-4	5'	<1	<1	<1	TAN SAND
TW-4	10'	<1	<1	<1	TAN SAND
TW-4	15'	<1	<1	<1	TAN SAND
TW-4	20'	<1	<1	<1	TAN SAND (DAMP)
TW-4	25'	94	<1	94	LIGHT GREY SAND (WET)

OVA: ORGANIC VOLATILE ANALYZER
BIO: BIOGENIC READING
TVH: TOTAL VOLATILE HYDROCARBONS
PPM: PARTS PER MILLION

APPENDIX A

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Closure Assessment Form

Owners of storage tank systems that are replacing, removing or closing in place storage tanks shall use this form to demonstrate that a system closure assessment was performed in accordance with Rule 17-761 or 17-762, Florida Administrative Code. Eligible Early Detection Incentive (EDI) and Reimbursement Program sites do not have to perform a closure assessment.

Please Print or Type
Complete All Applicable Blanks

1. Date: July 19, 1995
2. DER Facility ID Number: 17 / 9202973 3. County: Escambia
4. Facility Name: Pensacola Naval Air Station
5. Facility Owner: United States Navy
6. Facility Address: 190 Radford Blvd. Pensacola, Fl 32508
7. Mailing Address: 190 Radford Blvd.
8. Telephone Number: (904) 452-3900 9. Facility Operator: USN
10. Are the Storage Tank(s): (Circle one or both) A. Aboveground or B. Underground
11. Type of Product(s) Stored: Diesel Fuel Marine
12. Were the Tank(s): (Circle one) A. Replaced B. Removed C. Closed in Place D. Upgraded (aboveground tanks)
13. Number of Tanks Closed: 2 (Tank#681 & Tank#682) 14. Age of Tanks: 52 years

Facility Assessment Information

Yes	No	Not Applicable	
☐	☐		1. Is the facility participating in the Florida Petroleum Liability Insurance and Restoration Program (FPLIRP)?
☐	☐		2. Was a Discharge Reporting Form submitted to the Department? If yes, When: ____________ Where: ____________
☐	☐		3. Is the depth to ground water less than 20 feet?
☐	☐	☐	4. Are monitoring wells present around the storage system? If yes, specify type: ☐ Water monitoring ☐ Vapor monitoring
☐	☐	☐	5. Is there free product present in the monitoring wells or within the excavation?
☐	☐	☐	6. Were the petroleum hydrocarbon vapor levels in the soils greater than 500 parts per million for gasoline? Specify sample type: ☐ Vapor Monitoring wells ☐ Soil sample(s)
☐	☐	☐	7. Were the petroleum hydrocarbon vapor levels in the soils greater than 50 parts per million for diesel/kerosene? Specify sample type: ☐ Vapor Monitoring wells ☐ Soil sample(s)
☐	☐	☐	8. Were the analytical laboratory results of the ground water sample(s) greater than the allowable state target levels? (See target levels on reverse side of this form and supply laboratory data sheets)
☐	☐	☐	9. If a used oil storage system, did a visual inspection detect any discolored soil indicating a release?
☐	☐		10. Are any potable wells located within ¼ of a mile radius of the facility?
☐	☐		11. Is there a surface water body within ¼ mile radius of the site? If yes, indicate distance: ____________

DER Form #	17-761.900(6)
Form Title	Closure Assessment Form
Effective Date	December 10, 1990
DER Application No.	(Filled in by DER)

12. A detailed drawing or sketch of the facility that includes the storage system location, monitoring wells, buildings, storm drains, sample locatio and dispenser locations must accompany this form.
13. If a facility has a pollutant storage tank system that has both gasoline and kerosene/diesel stored on site, both EPA Method 602 and EPA Meth 610 must be performed on the ground water samples obtained.
14. Amount of soils removed and receipt of proper disposal.
15. If yes is answered to any one of questions 5-9, a Discharge Reporting Form 17-761.900(1) indicating a suspected release shall be submit to the Department within one working day.
16. A copy of this form and any attachments must be submitted to the Department's district office in your area and to the locally administered p gram office under contract with the Department within 60 days of completion of tank removal or filling a tank with an inert material.

Signature of Owner ____________ Date ____________

Signature of Person Performing Assessment ____________ Date 7/19/95

James A. Stidham-President-Jim Stidham & Associates, Inc.

Title of Person Performing Assessment

State Ground Water Target Levels That Affect A Pollutant Storage Tank System Closure Assessment

State ground water target levels are as follows:

1. For gasoline (EPA Method 602):
   a. Benzene 1 ug/l
   b. Total VOA 50 ug/l
      - Benzene
      - Toluene
      - Total Xylenes
      - Ethylbenzene
   c. Methyl Test-Butyl Ether (MTBE) 50 ug/l

2. For kerosene/diesel (EPA Method 610):
   a. Polynuclear Aromatic Hydrocarbons (PAHS) (Best achievable detection limit, 10 ug/l maximum)

— 5

APPENDIX B

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

DER Form #	17-761.900(1)
Form Title	Discharge Reporting Form
Effective Date	December 10 1990
DER Application No.	

Discharge Reporting Form

Use this form to notify the Department of Environmental Regulation of:

1. Results of tank tightness testing that exceed allowable tolerances within ten days of receipt of test result.
2. Petroleum discharges exceeding 25 gallons on pervious surfaces as described in Section 17-761.460 F.A.C. within one working day of disco
3. Hazardous substance (CERCLA regulated), discharges exceeding applicable reportable quantities established in 17-761.460(2) F.A.C., w one working day of the discovery.
4. Within one working day of discovery of suspected releases confirmed by: (a) released regulated substances or pollutants discovere the surrounding area, (b) unusual and unexplained storage system operating conditions, (c) monitoring results from a leak detection met or from a tank closure assessment that indicate a release may have occurred, or (d) manual tank gauging results for tanks of 550 gal or less, exceeding ten gallons per weekly test or five gallons averaged over four consecutive weekly tests.

Mail to the DER District Office in your area listed on the reverse side of this form

PLEASE PRINT OR TYPE
Complete all applicable blanks

1. DER Facility ID Number: 17 / 9202973   2. Tank Number: 681 & 682   3. Date: 7 / 19 / 95
4. Facility Name: Pensacola Naval Air Station
   Facility Owner or Operator: United States Navy
   Facility Address: 190 Radford Blvd. Pensacola, Fl 32508
   Telephone Number: (904) 452-3900   County: Escambia
   Mailing Address: 190 Radford Blvd. Pensacola, Fl 32508
5. Date of receipt of test results or discovery: July 5, 1995 7 / 5 / 95 month/day/y
6. Method of initial discovery. (circle one only)
   A. Liquid detector (automatic or manual)
   B. Vapor detector (automatic or manual)
   C. Tightness test (underground tanks only).
   D. Emptying and Inspection.
   E. Inventory control.
   F. Vapor or visible signs of a discharge in the vicir
   G. Closure: Monitor Well (expl
   H. Other:
7. Estimated number of gallons discharged: Unknown
8. What part of storage system has leaked? (circle all that apply) A. Dispenser B. Pipe C. Fitting D. Tank E. Unkno
9. Type of regulated substance discharged. (circle one)
   A. leaded gasoline
   B. unleaded gasoline
   C. gasohol
   D. vehicular diesel
   F. aviation gas
   G. jet fuel
   L. used/waste oil
   M. diesel
   O. new/lube oil
   V. hazardous substance includes pesticides, ammor chlorine and derivatives (write in name or Chemical Abstr Service CAS number)
   Z. other (write in name)
10. Cause of leak. (circle all that apply)
   A. Unknown
   B. Split
   C. Loose connection
   D. Corrosion
   E. Puncture
   F. Installation failure
   G. Spill
   H. Overfill
   I. Other (specify)
11. Type of financial responsibility. (circle one)
   A. Third party insurance provided by the state insurance contractor
   B. Self-insurance pursuant to Chapter 17-769.500 F.A.C.
   C. Not applicable
   D. None
12. **To the best of my knowledge and belief all information submitted on this form is true, accurate, and complete.**

Printed Name of Owner, Operator or Authorized Representative

Signature of Owner, Operator or Authorized Representative

Northwest District | Northeast District | Central District | Southwest District | South District | Southeast District

APPENDIX C

Environmental Conservation Laboratories
4810 Executive Park Court, Suite 211
acksonville, Florida 32216-6069
904 / 296-3007
Fax 904 / 296-6210

ENCO Laboratories

DHRS Certification No. E82277, 82417

CLIENT : Jim Stidham & Associates
ADDRESS: P.O. Box 13861
Tallahassee, FL 32317

REPORT # : JR9055
DATE SUBMITTED: July 1, 1995
DATE REPORTED : July 5, 1995

ATTENTION: Chris Brockmeier

SAMPLE IDENTIFICATION

Aqueous samples submitted and identified by client as:

PROJECT #: 3900

Pensacola NAS

06/29/95

#1 - MW-1 - GRAB @ 8:00
#2 - TW-1 - GRAB @ 9:30
#3 - TW-2 - GRAB @ 11:00
#4 - TW-3 - GRAB @ 11:45
#5 - TW-4 - GRAB @ 12:30

LABORATORY MANAGER ______________________
Richard Camp

ENCO LABORATORIES
REPORT # : JR9055
DATE REPORTED: July 5, 1995
REFERENCE : 3900
PROJECT NAME : Pensacola NAS

RESULTS OF ANALYSIS

EPA METHOD 602 - VOLATILE AROMATICS	MW-1	TW-1	TW-2 *	UNITS
Methyl tert-butyl ether	1 U	1 U	1 U	µg/L
Benzene	1 U	1 U	1 U	µg/L
Toluene	1 U	1 U	1 U	µg/L
Chlorobenzene	1 U	1 U	1 U	µg/L
Ethylbenzene	1 U	1 U	1 U	µg/L
m-Xylene & p-Xylene	1 U	1 U	**1**	µg/L
o-Xylene	1 U	1 U	**3**	µg/L
1,3-Dichlorobenzene	1 U	1 U	1 U	µg/L
1,4-Dichlorobenzene	1 U	1 U	1 U	µ[illegible]
1,2-Dichlorobenzene	1 U	1 U	1 U	µ[illegible]
Total Xylenes	1 U	1 U	**4**	µg/L
Surrogate:	% REC	% REC	% REC	LIMIT
Bromofluorobenzene (surr)	88	88	92	64-12
Date Analyzed	07/02/95	07/03/95	07/03/95	

* = Results confirmed by secondary analysis
U = Compound was analyzed for but not detected

ENCO LABORATORIES
REPORT # : JR9055
DATE REPORTED: July 5, 1995
REFERENCE : 3900
PROJECT NAME : Pensacola NAS

RESULTS OF ANALYSIS

EPA METHOD 610 - POLY AROMATIC HYDROCARBONS	MW-1	TW-1	TW-2	UNITS
Naphthalene	10 U	10 U	10 U	µg/L
2-Methylnaphthalene	10 U	10 U	10 U	µg/L
1-Methylnaphthalene	10 U	10 U	10 U	µg/L
Acenaphthylene	10 U	10 U	10 U	µg/L
Acenaphthene	10 U	10 U	10 U	µg/L
Fluorene	10 U	10 U	10 U	µg/L
Phenanthrene	10 U	10 U	10 U	µg/L
Anthracene	10 U	10 U	10 U	µg/L
Fluoranthene	10 U	10 U	10 U	µg/L
Pyrene	10 U	10 U	10 U	µg/L
Chrysene	10 U	10 U	10 U	µg/L
Benzo(a)anthracene	10 U	10 U	10 U	µg/L
Benzo(b)fluoranthene	10 U	10 U	10 U	µg/L
Benzo(k)fluoranthene	10 U	10 U	10 U	µg/L
Benzo(a)pyrene	10 U	10 U	10 U	µg/L
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	µg/L
Dibenzo(a,h)anthracene	10 U	10 U	10 U	µg/L
Benzo(g,h,i)perylene	10 U	10 U	10 U	µg/L
Surrogate:	% REC	% REC	% REC	LIMIT
2-Fluorobiphenyl (surr)	46	59	49	34-14
Date Extracted	07/03/95	07/03/95	07/03/95	
Date Analyzed	07/03/95	07/03/95	07/03/95	

U = Compound was analyzed for but not detected

ENCO LABORATORIES
REPORT # : JR9055
DATE REPORTED: July 5, 1995
REFERENCE : 3900
PROJECT NAME : Pensacola NAS

RESULTS OF ANALYSIS

EPA METHOD 602 - VOLATILE AROMATICS	TW-3	TW-4	LAB BLANK	UNITS
Methyl tert-butyl ether	1 U	1 U	1 U	µg/L
Benzene	1 U	2	1 U	µg/L
Toluene	1 U	5	1 U	µg/L
Chlorobenzene	1 U	1 U	1 U	µg/L
Ethylbenzene	1 U	81	1 U	µg/L
m-Xylene & p-Xylene	1 U	108	1 U	µg/L
o-Xylene	1 U	40	1 U	µg/L
1,3-Dichlorobenzene	1 U	1 U	1 U	µg/L
1,4-Dichlorobenzene	1 U	1 U	1 U	µ[illegible]
1,2-Dichlorobenzene	1 U	1 U	1 U	µg/[illegible]
Total Xylenes	1 U	148	1 U	µg/L
Surrogate:	% REC	% REC	% REC	LIMIT
Bromofluorobenzene (surr)	88	80	88	64-12
Date Analyzed	07/03/95	07/03/95	07/02/95	

U = Compound was analyzed for but not detected

ENCO LABORATORIES
REPORT # : JR9055
DATE REPORTED: July 5, 1995
REFERENCE : 3900
PROJECT NAME : Pensacola NAS

RESULTS OF ANALYSIS

EPA METHOD 610 - POLY AROMATIC HYDROCARBONS	TW-3	TW-4 *	LAB BLANK	UNITS
Naphthalene	10 U	100 U	10 U	µg/L
2-Methylnaphthalene	10 U	100 U	10 U	µg/L
1-Methylnaphthalene	10 U	100 U	10 U	µg/L
Acenaphthylene	10 U	100 U	10 U	µg/L
Acenaphthene	10 U	100 U	10 U	µg/L
Fluorene	10 U	100 U	10 U	µg/L
Phenanthrene	10 U	100 U	10 U	µg/L
Anthracene	10 U	100 U	10 U	µg/L
Fluoranthene	10 U	100 U	10 U	µg/L
Pyrene	10 U	100 U	10 U	µg/L
Chrysene	10 U	100 U	10 U	µg/L
Benzo(a)anthracene	10 U	100 U	10 U	µg/L
Benzo(b)fluoranthene	10 U	100 U	10 U	µg/L
Benzo(k)fluoranthene	10 U	100 U	10 U	µg/L
Benzo(a)pyrene	10 U	100 U	10 U	µg/L
Indeno(1,2,3-cd)pyrene	10 U	100 U	10 U	µg/L
Dibenzo(a,h)anthracene	10 U	100 U	10 U	µg/L
Benzo(g,h,i)perylene	10 U	100 U	10 U	µg/L
Surrogate:	% REC	% REC	% REC	LIMIT
2-Fluorobiphenyl (surr)	58	43	78	34-14
Date Extracted	07/03/95	07/03/95	07/03/95	
Date Analyzed	07/03/95	07/05/95	07/03/95	

* = Sample chromatogram reflects characteristic diesel pattern; lower dilution impractical due to non-target constituents.
U = Compound was analyzed for but not detected

ENCO LABORATORIES
REPORT # : JR9055
DATE REPORTED: July 5, 1995
REFERENCE : 3900
PROJECT NAME : Pensacola NAS

QUALITY CONTROL DATA

Parameter	% RECOVERY MS/MSD/LCS	ACCEPT LIMITS	% RPD MS/MSD	ACCEPT LIMITS
EPA Method 602				
Benzene	96/ 96/ 94	69-134	<1	17
Toluene	98/ 98/ 96	52-144	<1	14
Ethylbenzene	88/ 90/ 94	33-157	2	14
m-Xylene & p-Xylene	104/103/101	50-151	<1	14
EPA Method 610				
2-Methylnaphthalene	77/ 72/ 82	40-130	7	31
1-Methylnaphthalene	68/ 66/ 76	47-146	3	3[illegible]
Acenaphthylene	76/ 78/ 88	52-148	2	2[illegible]
Fluorene	76/ 81/ 74	70-144	6	17
Pyrene	97/ 97/100	62-170	<1	20

Environmental Conservation Laboratories Comprehensive QA Plan #910190G

< = Less Than
MS = Matrix Spike
MSD = Matrix Spike Duplicate
LCS = Laboratory Control Standard
RPD = Relative Percent Difference

ENCO Laboratories

ENVIRONMENTAL CONSERVATION LABORATORIES

4810 Executive Park Court, Suite 211
Jacksonville, Florida 32216-6069
Ph. (904) 296-3007 · Fax (904) 296-6210

10207 General Drive
Orlando, Florida 32824
Ph. (407) 826-5314 · Fax (407) 850-6945

CHAIN OF CUSTODY RECORD

CLIENT NAME: Jim Stidham + Assoc.

PROJECT MANAGER: C. Bockmeier

PROJECT NUMBER: 3900

PROJECT NAME: Pensacola NAS

SAMPLER'S SIGNATURE:

STATION NO.	DATE	TIME	COMPOSITE	GRAB	STATION LOCATION	NO. OF CONTAINERS	602 (HCl)	610							REMARKS
MW-1	6/29/95	8:00		✓		4	3	1							
TW-1	6/29/95	9:30		✓		4	3	1							
TW-2	6/29/95	11:00		✓		4	3	1							
TW-3	6/29/95	11:45		✓		4	3	1							
TW-4	6/29/95	12:30		✓		4	3	1							
~~TW-5~~															

RELINQUISHED BY	DATE/TIME	RECEIVED BY	RELINQUISHED BY	DATE/TIME	REMARKS
	6/29/95 4:00	Greyhound			JR9055
SAMPLE KIT PREPARED BY: ☐ ORLANDO ☐ JACKSONVILLE	DATE/TIME	RECEIVED BY	RECEIVED FOR LABORATORY BY:	☐ ORL ☒ JAX	
RELINQUISHED BY	DATE/TIME	RECEIVED BY		DATE/TIME 7/1/95 10:[illegible]	

APPENDIX B

INVESTIGATIVE DERIVED WASTE MANAGEMENT PLAN

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION
DRAFT INVESTIGATION-DERIVED WASTE PLAN
NAVAL AIR STATION
PENSACOLA, FLORIDA

SOUTHNAVFACENGCOM
CONTRACT NUMBER:
N62467-89-D-0318
CTO-036

Prepared for:

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN)
NAVAL SUPPORT ACTIVITY
NAVAL AIR STATION
PENSACOLA, FLORIDA

Prepared by:

ENSAFE/ALLEN & HOSHALL
5720 Summer Trees Drive, Suite 8
Memphis, Tennessee 38134
(901) 383-9115

June 10, 1994

Release of this document requires the prior notification of the Commanding Officer of the Naval Air Station, Pensacola, Florida.

Table of Contents

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List of Abbreviations

The following lists contains many of the acronyms, initials, abbreviations, and units of measure used in this report.

AOC	area of contamination
ARARs	applicable or relevant and appropriate requirements
AWQC	ambient water quality criteria
CAA	Clean Air Act
CAMU	Corrective Action Management Unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COLIWASA	Composite Liquid Waste Samplers
CLEAN	Comprehensive Long-Term Environmental Action Navy
cm	centimeters
CWA	Clean Water Act
DE	Disposable Equipment
DOT	Department of Transportation
E/A&H	EnSafe/Allen & Hoshall
FDEP	Florida Department of Environmental Protection
ft^3	Cubic Feet
gpm	gallons per minute
HSWA	Hazardous and Solid Waste Amendments
IDW	Investigation-Derived Waste
IR	Installation Restoration
IWTP	Industrial Wastewater Treatment Plant
JP	Jet Propulsion
LDR	Land Disposal Restrictions
MCL(s)	Maximum Contaminant Level(s)
MCLG	Maximum Contaminant Level Goals
ml	milliliter
MTRs	Minimum Technological Requirements
NAS	Naval Air Station
NCP	National Contingency Plan
NPL	National Priorities List
OD	Outside Diameter
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
POL	Petroleum Oils and Lubricants
POTW	Publicly Owned Treatment Works
PPE	Personal Protective Equipment
ppm	Parts Per Million or milligrams per kilogram
PSC	Potential Source of Contamination

QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RT	Regulatory Threshold
SDWA	Safe Drinking Water Act
SMP	Site Management Plan
SOP/QAM	Standard Operating Procedures and Quality Assurance Manual
SVOCs	Semivolatile Organic Compounds
TBC	To-be-considered
TCLP	Toxicity Characteristic Leaching Procedure
TRPHs	Total Recoverable Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, or Disposal
TU	Temporary Unit
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

The following discussion outlines the manner in which investigation-derived waste (IDW) will be managed to comply with all applicable or relevant and appropriate requirements (ARARs). IDW generated during the investigations will likely include soil produced during the advancement of hand auger borings and soil borings and the installation of monitoring wells; groundwater derived from developing and purging of monitoring wells; disposable personal protective equipment and sampling utensils; decontamination fluids generated from the cleaning of personal protective equipment, sampling equipment, and drilling equipment. As the generator of the IDW, the Navy will be responsible for the ultimate treatment, storage, or disposal of all IDW. E/A&H will provide technical assistance to the Navy during the management of all IDW.

2.0 IDENTIFICATION OF ARARS

The National Contingency Plan (NCP) requires IDW handled at National Priorities List (NPL) sites, including federal facilities to meet all ARARs to the extent practicable considering the situation's urgency. The NCP is codified at 40 Code of Federal Regulations (CFR) Part 300. Likewise, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 120(a)(4) requires investigation and remediation activities at non-NPL federal facilities to meet the substantive requirements of applicable state laws.

2.1 ARARs Defined

Applicable requirements are standards or criteria promulgated under federal law that specifically address a hazardous substance, pollutant contaminant, remedial action, location, or other circumstance at a project site (USEPA 1988a). Resource Conservation and Recovery Act (RCRA) requirements are applicable when a waste generated at a CERCLA site meets the definition of a solid hazardous waste.

Relevant and appropriate requirements are standards or criteria promulgated under federal or state laws that are suited to a particular site because they address site scenarios sufficiently similar to those on which the regulations are based. Identifying ARARs first dictates determining whether they are both relevant and appropriate. This evaluation compares a number of site-specific factors with those addressed in the statutory or regulatory requirements. Factors considered include the hazardous substances present at the site, physical site features, or the type of remedial action. A given requirement might be relevant, but not appropriate, for the project site. Therefore, such a requirement would not be an ARAR for the site. When a requirement is deemed both relevant and appropriate in a given case, this requirement must be complied with to the same degree as if it were applicable. An example of a relevant and appropriate requirement is the use of maximum contaminant levels (MCLs) as cleanup standards for water. The MCLs are not applicable, because the Navy is not using the contaminated water to supply drinking water. However, MCLs are relevant and appropriate because the water may be treated for potential use as drinking water in the future.

To-be-considered (TBC) criteria are federal- or state-issued guidance or non-promulgated advisories that are not legally binding and do not have the status of potential ARARs. In many circumstances, TBC criteria will be reviewed along with ARARs in determining an IDW level that sufficiently protects human health or the environment. This review will occur before selecting an IDW management option.

There are several types of ARARs, including chemical-specific, action-specific, and location-specific ARARs. Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies applied to site-specific conditions. These values establish an acceptable concentration of a chemical substance that may be found in or discharged to the ambient environment. MCLs are examples of chemical-specific ARARs. Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous substances. An example of an action-specific ARAR is an emissions limit on a chemical constituent for incineration to treat contaminated soil. Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations. Location standards for RCRA facilities are location-specific ARARs when a new waste management unit is created to treat or dispose of waste at a CERCLA site.

Federal environmental laws and regulations that are potential ARARs for IDW at CERCLA sites include RCRA, including the Land Disposal Restrictions (LDR) and Corrective Action Program; the Toxic Substances Control Act (TSCA), the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), and the Clean Air Act (CAA). State and local environmental laws and regulations also may serve as ARARs. State regulations may have a great impact on how IDW is managed, since states may promulgate more stringent requirements than the federal requirements for many programs, including the solid and hazardous waste program.

Although CERCLA exempts response actions conducted entirely onsite from permit requirements, the United States Environmental Protection Agency (USEPA) does require that the substantive issues are addressed if the containerized IDW is RCRA hazardous waste (USEPA 1988a). RCRA hazardous IDW containerized and stored onsite should be properly disposed of within a regulatory timeframe. However if the regulatory timeframe cannot be met, storage does not require a permit. Actions that take place offsite are subject to all permitting requirements.

2.2 Resource Conservation and Recovery Act

RCRA was passed by Congress in 1976 to meet three goals: (1) to protect human health and the environment, (2) to reduce waste and conserve energy and natural resources, and (3) to reduce or eliminate the generation of hazardous waste as expeditiously as possible. The Hazardous and Solid Waste Amendments (HSWA) of 1984 significantly expanded RCRA's scope by adding new corrective action requirements, LDRs, and minimum technological requirements (MTRs) (USEPA 1988b).

RCRA is the most important federal ARAR for managing IDW, because it specifically regulates solid waste disposal and all aspects of transportation, treatment, storage, and disposal of hazardous waste. RCRA is applicable to management of IDW at CERCLA sites if the IDW is stored or disposed of offsite. If IDW is stored onsite, then the IDW must be managed to comply with RCRA to the extent practical.

RCRA has 10 subtitles addressing specific waste management activities. Two of these subtitles and their implementing regulations may be ARARs for IDW handling: Subtitle C (Hazardous Waste Management) and Subtitle D (Solid Waste Management). The regulations are codified in 40 CFR Parts 260 through 272.

RCRA was developed first and foremost as a prevention-oriented program, with a primary objective to prevent new releases resulting in contaminated sites. Following this objective, stringent standards were developed to ensure human health and the environment were protected from such ongoing waste management. The Subtitle C regulations are specified as uniform, national standards with which all RCRA-regulated facilities must comply. These standards generally are very stringent because they must ensure an adequate level of protection nationally. The standards must prevent or minimize environmental releases over a wide range of hazardous waste types, environmental conditions, operational contingencies, and other factors. The HSWA amendments strengthened the RCRA prevention program by adding the LDRs and MTRs that have become central features of the RCRA prevention program. These features added incentives to generators to minimize the amounts of waste being created by providing technology-based standards for hazardous waste treatment, in the case of LDRs, and land-based disposal units design, in the case of MTRs.

Under RCRA Subtitle C, wastes are hazardous on the basis of their source or method of generation ("listed" wastes) or their chemical constituents or characteristics ("characteristic" wastes). The hazardous waste identification rules are codified in 40 CFR Part 261. For example, 1,1,1-trichloroethane is a listed waste when it is a spent solvent. Based on the "contained-in" interpretation, soil, groundwater, and other investigation wastes containing this listed waste also would be considered hazardous (USEPA 1986). Characteristic hazardous wastes include those wastes with one or more characteristics of ignitability, corrosivity, reactivity, and toxicity. Determining whether a waste is hazardous may be based on knowledge of the IDW and associated suspected or known contamination, rather than by direct testing (USEPA 1991). The IDW generator may choose to characterize the waste as hazardous or non-hazardous based on the site history and environmental data for the surrounding area, without actually collecting a sample of the waste and testing it for hazardous waste parameters.

2.2.1 Land Disposal Restrictions

With respect to managing IDW, the LDR program is one of the most significant provisions of RCRA. The LDR program, defined in RCRA Section 3004 and codified in 40 CFR Part 268, establishes technology-based standards that must be met before placing hazardous waste into land disposal units, which include landfills, surface impoundments, waste piles, and other land-based units. Hazardous waste generators must notify receiving hazardous waste facilities that a waste is restricted from land disposal. Certification is required for all restricted wastes that meet LDR treatment standards when the waste is land disposed.

For the purpose of managing IDW, land disposal occurs when any of the following activities take place:

- Wastes from different areas of contamination (AOC) are consolidated and disposed of in one AOC.

- Wastes are moved outside an AOC for storage or treatment and are returned to the same or a different AOC.

- Wastes are excavated from an AOC, removed to a separate unit such as a tank, surface impoundment or incinerator that is within the AOC, and then are redeposited into the AOC (USEPA 1991).

The concept of an AOC can be used to determine whether LDRs apply to a given situation; however, this concept applies only to contaminated soil or sediment from the site. Contaminated personal protective equipment (PPE), disposable equipment (DE), extracted ground water, or decontamination fluids that may be generated by investigation activities at the site are not exempted from LDRs if disposed of within an AOC. USEPA has not yet issued a regulatory definition of the term "AOC," but the preamble to the NCP (55 FR 8760) states "USEPA generally equates the CERCLA area of contamination with a single RCRA land-based unit, usually a landfill." It is further noted that "under RCRA the term 'landfill' could include a non-discrete land area on or in which there is generally dispersed contamination."

LDRs limit the constituent concentrations of wastes that may be disposed in land units (such as landfills and surface impoundments). An important consideration in evaluating the applicability or relevance and appropriateness of LDRs is whether land disposal of hazardous IDW will occur as a result of the proposed storage or disposal method. Based on the delineation of an AOC, LDRs are not ARARs when uncontained hazardous IDW (soil or sediment) is handled as follows:

- Capped in place
- Treated in situ
- Processed within the AOC to improve structural stability
- Left in place, moved, or stored within a single AOC unit

LDRs prohibit storing restricted hazardous waste beyond specified time limits, unless the purpose is to accumulate sufficient quantities to promote proper disposal, treatment, or recovery. However, under CERCLA there is no time limit for storing IDW in the AOC until a final disposal option is selected in the record of decision (ROD).

All LDRs must be followed to the extent practical if hazardous IDW cannot be held within the delineated AOC. For example, if leaving hazardous IDW within the AOC would significantly increase risk to human health and the environment through the potential of fire, explosion, toxicity, or other hazard, then the IDW should be managed at an offsite RCRA Subtitle C hazardous waste treatment, storage, or disposal (TSD) facility.

2.2.2 Corrective Action Program

In addition to the prevention-oriented provisions of RCRA, the HSWA corrective action program created a very different mandate: cleaning up releases from solid waste management units at more than 4,000 RCRA TSD facilities. While implementing these requirements and through its experience with the Superfund program, USEPA found that Subtitle C requirements, when applied to remediation wastes, could be a disincentive to more protective remedies. These requirements also provided very limited flexibility in choosing the most practical remedy at a specific site. In response to this, USEPA created two types of waste management units, the Corrective Action Management Unit (CAMU) and the Temporary Unit (TU), as a mechanism for providing more regulatory flexibility at remediation sites conducted under the auspices of RCRA while maintaining a standard of environmental protection.

CAMUs

CAMUs are land-based units that can be used to manage wastes during site remediation. CAMUs provide two primary advantages:

- Placing remediation wastes into or within a CAMU does not constitute land disposal of hazardous wastes, so that LDR standards are not triggered.

- Consolidating or placing remediation wastes into or within a CAMU does not constitute creating a unit subject to MTRs.

Although CAMUs are permitted by the USEPA, they must comply with state and local regulations. Currently, there are no permitted CAMUs.

TUs

TUs are for short-term operation of tanks and container storage units used to treat or store remediation wastes for investigations conducted under RCRA. These units may only be used for remediation wastes, and they must be located at the facility where the remediation is occurring. TUs do not include incinerator, non-tank thermal treatment devices, or units regulated under 40 CFR Part 264 Subpart X (miscellaneous units). The corrective action regulations for temporary units allow an alternative design, operating, or closure standard to be applied rather than the standards that normally apply to permitted facilities. Wastes can be stored in a TU for up to one year, with extensions available on a case-by-case basis.

2.3 Toxic Substances Control Act

Congress passed TSCA in 1976 to establish requirements and authorities for identifying and controlling toxic chemical hazards to human health and the environment. While the majority of regulations promulgated under TSCA address chemical manufacturing, the law also covers managing and disposing wastes containing polychlorinated biphenyls (PCBs) in 40 CFR Part 761 and asbestos in 40 CFR Part 763. These regulations potentially affect IDW management in at least two ways:

- Non-hazardous IDW under RCRA that contains PCBs at concentrations greater than specified limits must be managed at facilities permitted under TSCA. Incineration is the most common option for wastes containing 50 parts per million (ppm) PCBs or greater.

- Non-hazardous IDW with PCB concentrations less than 50 ppm are generally not regulated under TSCA, although some states regulate these wastes as hazardous.

2.4 Clean Water Act

The CWA, developed in 1977, provides site-specific pollutant discharge limitations and performance standards for specific industries to protect surface water quality. During an investigation, the most likely situation where the CWA will be applicable involves indirectly discharging IDW water to a Navy owned treatment works (NOTW), publicly owned treatment works (POTW), or a wastewater treatment plant for treatment (USEPA 1991). A less likely situation may involve direct discharge, either onsite or offsite, to surface water. The CWA also regulates criteria for selecting POTWs and sets ambient water quality criteria (AWQC) to protect human health and aquatic life. Regulations under the CWA are codified in 40 CFR Parts 121 through 136.

2.5 Safe Drinking Water Act

The SDWA which was enacted in 1974 and most recently amended in 1986, mandates the USEPA establish regulations to protect human health from contaminants in drinking water. Regulations for the SDWA are codified in 40 CFR Parts 141 through 149. The legislation authorizes national drinking water standards and a joint federal-state system for assuring compliance with those standards.

USEPA has developed two sets of drinking water standards, referred to as primary and secondary standards, to protect human health and to ensure the aesthetic quality of drinking water, respectively (USEPA 1988b). Primary standards consist of contaminant-specific standards, known as maximum contaminant levels (MCLs). These are set as close as feasible to MCL goals (MCLGs), which are purely health-based. Secondary drinking water standards are guidelines regulating the aesthetic quality of water supplies, such as clarity and odor, and are not enforceable at the federal level. At a minimum, states must enforce the federal MCLs. In some cases, states establish and enforce secondary standards equal to or more stringent than USEPA's.

Under Section 1424(e) of SDWA, an aquifer identified as the sole or principal source of drinking water for any area may be designated as a "sole source aquifer". No commitment of federal financial assistance may be made for any project that may contaminate a sole source aquifer so as to create a significant public health hazard. No IDW disposal actions should occur that could affect a sole source aquifer without considering MCLs and the ARARs.

3.0 GENERATION OF INVESTIGATION-DERIVED WASTE

Activities that may generate IDW during operations at installation restoration (IR) sites include preliminary site investigations, removal actions, and remedial investigations. IDW may include drilling muds, soil cuttings, purged groundwater, decontamination fluids, DE, and PPE.

3.1 Sources of IDW

Table 3-1 summarizes all sites to be investigated and lists the known or suspected contaminants for each site.

Table 3-1
Summary of Investigation-Derived Waste Sources

Source (Site)	Site Name	Known or Suspected Contaminants
1	Sanitary Landfill	Metals, TRPHs, VOCs, PAHs, phenols
2	Waterfront Sediments	Metals, TRPHs, VOCs, PAHs
3	Crash Crew Training Area	Metals, TRPHs, VOCs, PAHs, phenols
4	Army Rubble Disposal Area	Unknown
5	Borrow Pit	Unknown
6	Fort Redoubt Rubble Disposal Area	Unknown
7	Firefighting School	POLs
8	Rifle Range Disposal	Solid waste, paper
9	Navy Yard Disposal Area	Metals, TRPHs, PAHs
10	Commodore's Pond	Metals, TRPHs, PAHs, phenols
11	North Chevalier Disposal Area	Metals, TRPHs, VOCs, PAHs, phenols
12	Scrap Bins	Metals, TRPHs, PAHs, phenols, PCBs
13	Magazine Point Rubble Disposal Area	TRPHs, VOCs, PAHs, phenols
14	Dredge Spoil Fill Area	Metals, TRPHs, VOCs, PAHs, phenols
15	Pesticide Rinsate Disposal Area	Metals, TRPHs, VOCs, PAHs, pesticides
16	Brush Disposal Area	Metals
17	Transformer Storage Yard	Metals, TRPHs, PAHs, VOCs, PCBs
18	PCB Spill Area	Metals, TRPHs, PAHs, VOCs, PCBs
22	Refueler Repair Shop	Aviation Gas, JP with lead

Table 3-1 (Continued)
Summary of Investigation-Derived Waste Sources

Source (Site)	Site Name	Known or Suspected Contaminants
24	DDT Mixing Area	DDT with diesel fuel
25	Radium Spill Site	Radioactive Waste
26	Supply Department Outside Storage	Industrial Waste, Oils
27	Radium Dial Shop	Radium, phosphors
28	Transformer Accident	Transformer Oil
29	Soil South of Building 3460	Metals, TRPHs, PAHs, VOCs
30 and formerly PSC 31	Buildings 649 and 755, Building 648	Metals, TRPHs, VOCs, PAHs, phenols
32, 33, 35	Industrial Wastewater Treatment Plant	Metals, VOCs, SVOCs
34	Solvent North of Building 3557	Metals, TRPHs, PAHs, phenols
36	Industrial Waste Sewer	Metals, TRPHs, PAHs, phenols
38	Building 71	Metals, VOCs, PCBs
39	Oak Grove Campground	Debris, POL, broken clay, coal, cleaning solutions
40	Bayou Grande	Unknown
41	NAS Pensacola Wetlands	Unknown
42	Pensacola Bay	Unknown

Key:

PSC	=	Potential Source of Contamination
TRPHs	=	Total Recoverable Petroleum Hydrocarbons
VOCs	=	Volatile Organic Compounds
PAHs	=	Polynuclear Aromatic Hydrocarbons
PCBs	=	Polychlorinated Biphenyls
SVOCs	=	Semivolatile Organic Compounds
POL	=	Petroleum, Oils and Lubricants
JP	=	Jet Propulsion

Source: U.S. Navy 1993

Field activities performed during the site investigations that may generate IDW typically include some or all of the following:

Activity	**Waste Type**
Monitoring Well Installation	Soil cuttings, decontamination fluids, drilling mud, PPE, DE
Monitoring Well Development	Development water, silt, decontamination fluids, PE, DE
Groundwater Sampling	Purge water, decontamination fluids, PPE, DE
Soil Boring	Soil cuttings, drilling mud, decontamination fluids, PPE, DE
Soil Excavation/Trenching	Soil cuttings, decontamination fluids, PPE, DE
Soil Sampling	Soil cuttings, decontamination fluids, PPE, DE
Sediment Sampling	Sediment, decontamination fluids, PPE, DE
Surface Water Sampling	Decontamination fluids, PPE, DE
Aquifer Testing	Development water, decontamination fluids, PPE, DE
Radiation Monitoring	PPE, DE

The wastes described above may be regulated as hazardous for the purposes of storage, treatment, or disposal. Section 4 describes how this determination will be made and how IDW will be characterized. Once the IDW is characterized, a decision may be made on properly managing the waste. In addition to the waste types listed above, general refuse may be created during field activities, including packaging materials, broken or cut-off well screen, and casing. Typically, this refuse is managed as non-hazardous material and disposed of accordingly.

3.2 IDW Volume Estimates

Various field activities conducted in an investigation may create IDW. Estimated typical volumes of IDW generated from field activities are shown below.

- **Screening:** Screening studies typically include soil-gas, soil-probe, geophysical surveys, and water level measurements. These activities may generate several 55-gallon drums of decontamination fluid, PPE, DE and groundwater during the course of the initial studies.

- **Drilling:** Drilling an 8-inch-outside-diameter (OD) soil boring will generate a minimum of 0.35 cubic feet (ft^3) or 2.6 gallons of soil cuttings per linear foot of borehole. A 25-foot soil boring therefore would generate approximately 9.0 ft^3, or 65 gallons, of soil cuttings (approximately 1.25 55-gallon drums). Table 3-2 shows the relationship between the diameter of the borehole and the potential volume of soil cuttings generated. Larger diameter soil borings will generate proportionately larger quantities of soil. Additional quantities of soil should be expected due to its expansion following removal from the borehole (known as bulking) and slough created during drilling, especially if poorly consolidated materials are encountered. The bulking is estimated to increase soil cutting volume by 30 percent. Soil cuttings from drilling typically will be placed into 55-gallon containers.

Table 3-2 Volume of Soil Cuttings Generated for Typical Diameter Boreholes				
Hole Diameter (inches)	Undisturbed Volume of Soil per Linear Foot of Hole		Volume of Loose Soil per Lineal Foot of Hole	
	Gallons	Ft^3	Gallons	Ft^3
6.0	1.5	0.20	2.0	0.26
8.0	2.6	0.35	3.4	0.46
10.0	4.0	0.54	5.2	0.70
12.0	5.8	0.78	7.5	1.01

NOTES:
1 ft^3 = 7.5 gallons (approximately)
1 Gallon = 0.134 ft^3 (approximately)

- **Well Development or Purging and Groundwater Sampling:** The volume of groundwater from monitoring well development and groundwater sampling depends on a number of variables, including the turbidity of the groundwater, well diameter, length of screened interval, diameter of the saturated filter pack, and porosity of the material used as filter packing.

  Complete well development requires removing of well drilling relics to establish proper flow conditions and until field parameters have stabilized. Table 3-3 shows the estimated water volumes for various well screen diameters and borehole diameters, assuming a 30 percent porosity within the filter pack.

Table 3-3 Volume of Water Generated for a Typical Well Casing and Borehole Combination	
Well Casing/Boring Diameter (inches)	Volume of Water Generated per Lineal Foot of Hole (gallons)
2/8	0.9
4/10	1.2
4/12	2.2

For example, a 4-inch well with a 10-inch borehole would contain approximately 1.2 gallons of fluid per foot of saturated zone. If no additional construction water was used and only three volumes of water were pumped for the development of 15 feet of saturated material, the well would produce approximately 54 gallons of fluid.

For hollow-stem drilling, additional water typically is used for flowing sand conditions. For normal well construction, minimal additional water would be used. Additional water would be generated during later purging and sampling and would be specific to the conditions for the well. The water generated during these activities typically will be placed in 55-gallon containers or in portable storage tanks.

- **Aquifer testing:** Aquifer tests which may be conducted at the Naval Air Station Pensacola may generate large quantities of groundwater, depending on the hydraulic properties of individual screened formations. A well installed in a formation with a high transmissivity will sustain a higher pumping rate and generate greater quantities of water. A typical test would be 1.5 to 2 times the expected withdrawal rate for the recovery system. It is anticipated withdrawal rates for NAS Pensacola will range from approximately 10 gallons per minute to 250 gallons per minute. With large volumes such as this, it will be necessary to use 20,000-gallon portable tanks to store water these tests generate. This water may undergo treatment at the onsite IWTP or be transported to an offsite facility. Slug tests typically will generate a small-to-moderate volume of decontamination fluid. In some instances, it may be possible to store fluids from several different aquifer tests in one container.

- **Trenching and Subsurface Exploration:** For trenching or other large-volume excavations, it will be necessary to store the wastes in large covered roll-off bins or on an appropriate liner material and to cover it. If possible, and when appropriate and approved by the regulatory agencies, the best option may be to return the materials to the excavation.

- **PPE, DE, and Decontamination Fluid:** The volume of IDW generated as PPE, DE, and decontamination fluids during each field activity depends on a number of site-specific factors and therefore will vary in quantity. Site-specific factors include the USEPA health and safety work level (Level D, Level C, or Level B), number and type of field activities per site, and total number of sites being investigated. PPE waste volumes typically will account for one-half of a 55-gallon container per day for a crew of four. Decontamination fluid will vary from a few gallons per day for decontaminating monitoring instruments to several hundred gallons per day for large equipment such as drilling rigs.

4.0 CHARACTERIZING INVESTIGATION-DERIVED WASTE

Identifying and characterizing IDW should begin in the planning stages of field activities. First, it must be determined if the IDW contains CERCLA hazardous substances, and whether these hazardous substances constitute either RCRA hazardous wastes or contaminants regulated under other statues. The origin of the waste must be determined as well as the chemical contaminants and their concentrations. Typically, sampling data obtained from site characterization or investigation activities provide an initial determination of whether a waste is hazardous. If necessary, IDW is sampled and submitted for TCLP analysis to provide additional information and to determine specific hazardous waste characteristics. Environmental samples relevant to IDW are soil samples (for soil cuttings and excavated soil) and groundwater samples (for purge water and development water).

The Navy as *"Generator"* of the waste retains all responsibility for characterizing the containerized waste as hazardous or non-hazardous according to 40 Code of Federal Regulations (CFR) 260. The Navy characterizes its waste in accordance with NAS Pensacola Instruction 5090.1B *Hazardous Waste Management Program* (NAS Pensacola 1994).

4.1 RCRA Hazardous Wastes and CERCLA Hazardous Substances

Some CERCLA hazardous substances are RCRA hazardous waste. PCBs also are considered CERCLA hazardous substances. Identification of RCRA hazardous waste and PCB-contaminated IDW is essential for making storage and disposal decisions. The presence of RCRA hazardous wastes invoke special considerations. The RCRA program recognizes two general classes of waste at the federal level: hazardous and non-hazardous. Solid wastes are defined by RCRA to be hazardous either by being a listed waste, determined by the wastes's origin or by its contaminant concentrations.

4.2 RCRA Listed Hazardous Waste

The E/A&H site manager is responsible for identifying any potential listed hazardous wastes that may be present at the site. The site manager establishes the site's history and use, and determines whether activities there generate, or have generated, listed hazardous wastes. Examples of activities that may generate listed wastes include use of solvents, rinsing and management of pesticide containers, electroplating, dry cleaning, and wood treatment. USEPA provides guidance in the level of effort required to establish whether listed waste activities are involved at investigation sites. USEPA states that "at many CERCLA sites no information exists on the source of the wastes nor are references available citing the date of disposal. The U.S. Navy should use available site information, manifests, storage records, and vouchers in an effort to ascertain the source of these contaminants. When this documentation is not available, the U.S. Navy may assume that the wastes are not listed RCRA hazardous wastes, unless further analysis or information becomes available which allows the lead agency to determine that the wastes are listed RCRA hazardous wastes" (USEPA 1990).

Once it has been determined that a listed waste is involved at a field activity site, the environmental analytical data should be reviewed to determine if the IDW contains any hazardous constituent found in the RCRA listed waste. USEPA's "contained-in" policy states that media such as soil and groundwater containing a listed hazardous waste must be managed as such until they no longer contain that waste. There is no established policy on how to determine when the media no longer contains the listed hazardous waste. Usually this determination is made on a case-by-case basis. Two aspects should be considered for managing IDW: whether the waste also may be hazardous for characteristics (as described in Section 4.3) and whether the cost of additional analytical work will offset the cost of managing the waste as a listed hazardous waste. In addition to identifying potential listed criteria, IDW also should be evaluated for characteristic hazardous waste criteria, as described in Section 4.3.

4.3 RCRA Characteristic Hazardous Waste

Characteristic hazardous wastes are based on general criteria. In order for a waste to be considered a characteristic hazardous waste, it must exhibit one or more of the following properties, as defined in 40 CFR §261.21 through §262.24:

- Ignitability
- Corrosivity
- Reactivity
- Toxicity
    - Heavy Metals
    - Volatile Organic Compounds
    - Semivolatile Organic Compounds
    - Pesticides and Herbicides

IDW does not usually exhibit the characteristics of ignitability, corrosivity, or reactivity due to the waste's nature and matrix. Typically, IDW waste consists of low concentrations of contaminants in soil and water. The quantities of these contaminants typically are insufficient to cause the soil or water to exhibit any of the characteristics of ignitability, corrosivity, or reactivity.

The characteristic for toxicity is based on the waste's leaching characteristics. The Toxicity Characteristic Leaching Procedure (TCLP) simulates the effect of hazardous constituents leaching from a waste; USEPA bases regulatory limits to protect human health and the environment on the TCLP test. Reviewing environmental data to initially screen the IDW helps eliminate some or all of the toxicity characteristics. USEPA provides that if a total analysis demonstrates the individual constituents are not present in the waste, or they are present but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run (40 CFR Part 261, Appendix II). IDW to be left onsite should not containerized or tested.

4.4 CERCLA Hazardous Substances

If the IDW does not contain RCRA "hazardous waste", it should be determined if the IDW contains other CERCLA hazardous substances. CERCLA hazardous substances include, in addition to RCRA hazardous wastes, substances, elements, compounds, solutions, or mixtures designated as hazardous under CERCLA or under the authority of another ARAR including TSCA, CWA, CAA, and SDWA. CERCLA hazardous substances are listed in 40 CFR Part 302.4, Table 302.4.

5.0 SAMPLING AND ANALYSIS

Sampling and analyzing IDW will be conducted when corresponding environmental sample data are not available or when details are needed about the waste. Sampling of soil or sediment IDW may occur as the waste is generated (i.e., as the boring is advanced) or may be collected from the containerized waste. All samples collected for waste analysis should be representative of the waste being sampled. Therefore, the samples should be composited. If the soil or sediment IDW is to be disposed of offsite, samples for TCLP analysis may be collected during advancement of the soil boring or from the containerized waste. If the IDW is to be disposed of within the AOC, sampling is not required. Guidelines for collecting representative samples are contained in Chapter 9 of *Test Methods for Evaluating Solid Waste* (USEPA 1986). Sampling methods are detailed in Appendix A.

5.1 Completing a Waste Profile

IDW is characterized through knowledge of the waste, review of environmental data correlating to the waste, or sampling and analyzing the waste itself. This characterization leads to a waste profile summarizing all the information available on the IDW. The waste profile is required for shipping any IDW to offsite facilities. It should be completed for all wastes generated in investigation activities as an accurate record of the waste identification, source, and characteristics. The profile also can describe wastes that are generated consistently and have similar or identical characteristics. For example, if a site investigation is conducted over many months and soil cuttings are generated consistently over that period, one waste profile may be completed to describe all the soil cuttings, even though they may be shipped offsite at different times throughout the investigation. Once that profile is approved, it may be used for subsequent shipments of the same waste without completing and approving a new profile. Appendix B includes the waste profile form.

Completing all 11 sections of the profile ensures all necessary information is obtained to properly manage the waste. Each blank on the profile form should be filled in, even if the appropriate response is "not applicable" or a zero value. The sections cover these subjects:

- Generator Information
- Waste Description
- Transportation Information
- Physical Properties
- Toxicity Characteristics
- Total Metals
- Other Solvent Constituents
- Chemical Composition
- Additional Information and Comments
- Technical Review
- Generator Certification

In most cases, environmental data gathered during the site investigation will be used to characterize the associated IDW. This process allows the IDW to be characterized more quickly and minimizes the sampling and analysis of IDW by providing an initial review of potential hazardous waste categories that may apply.

Once the waste profile has been completed, it will be signed by the Navy installation environmental coordinator. The waste profile then will be used for obtaining approval for treatment or disposal at offsite TSD facilities and for evaluating possible onsite treatment and disposal options.

5.2 Management of Disposable PPE and Equipment

Disposable PPE and DE will be managed according to the type of activity and concentration of contamination encountered with the equipment. In general, most PPE and DE will be managed as non-hazardous solid waste, particularly if little contact occurs with the sampling media and low concentrations of contaminants are involved. The IDW should be placed in plastic bags and transferred to an onsite industrial dumpster, whose contents is routinely disposed of in an municipal landfill. A second option is to transport the IDW to a suitable offsite municipal solid waste landfill.

Contaminated PPE and DE used in collection of samples from known highly contaminated areas will be placed in 55-gallon drums, accurately labeled as discussed in Section 5.6 and stored at a container storage area. PPE and DE will be stored until adequate characterization is complete for the site or for the containerized PPE and DE. The environmental sampling results from the sites where the IDW was generated will be reviewed when available. PPE and DE that is contaminated with listed hazardous waste will be managed as hazardous waste, and will be characterized in a manner consistent with the media being sampled.

5.3 Management of Empty Drums

Empty drums may be generated in rare cases, such as when IDW is consolidated onsite to minimize the number of containers shipped to offsite waste management facilities. Empty drums also may be generated when IDW is removed from containers for onsite treatment or disposal. Federal regulations require empty containers that held hazardous waste to be emptied to the maximum extent practicable before further management. In addition, if the container was used for an acutely hazardous waste, it must be decontaminated via triple rinsing before further management (40 CFR 261.7[3]).

Federal regulations exempt empty containers from regulation as hazardous waste. However, in order to retain the exemption, the empty container must be managed in one of the following ways:

- Dispose of it at an approved solid waste management facility, if 5-gallon capacity or less.
- Reclaim its scrap value onsite or ship the container to a reclaimer for its scrap value.
- Recondition or remanufacture the container onsite for subsequent reuse, or ship it to reconditioner or remanufacturer.
- Ship the container to a supplier or another intermediate collection location for accumulation before managing the container.

6.0 STORAGE

Specific IDW storage requirements depend on a number of factors, including the auspices under which the investigation is being conducted, location of the storage area, the length of storage, the type of storage unit, the type of waste, and the regulatory status of the storage unit. Storage of non-hazardous waste and designated waste in drums and portable tanks is not regulated by USEPA.

Storage of hazardous waste is regulated on the federal and state levels, with four options discussed further:

- Accumulation within the AOC
- Storage in a TU
- Accumulation for up to 90 days from the date of generation
- Storage in a unit that meets permitted facility standards

Selection of an applicable option may be dependent on:

- State laws and interpretations
- Applicable statutes under which the investigation is being conducted
- Site-specific issues

The location of IDW storage may be within the AOC or at another location of the installation. It is important to carefully consider the location chosen for IDW storage, since it may affect the applicability of some RCRA requirements such as LDRs and MTRs. IDW is generally stored in a manner meeting the requirements for hazardous waste storage until environmental data or other information prove otherwise. Typically, IDW is accumulated within the AOC or at a centralized storage area that complies with RCRA requirements for storing both solid and hazardous IDW.

6.1 Accumulation within the AOC

Accumulation of IDW within the AOC is appropriate for investigations conducted under CERCLA. In addition, if IDW is merely being moved within the AOC, land disposal is not considered to have occurred, therefore LDRs are not triggered. An evaluation of the IDW handling technique must be conducted to determine if the technique constitutes land disposal. Activities which constitute land disposal are detailed in Section 2.2.1 Land Disposal Restrictions. If IDW cannot be deposited within the AOC, IDW handling and disposal must comply with all LDRs to the extent practical.

6.2 Storage in a Temporary Unit

TUs are appropriate for investigations conducted under RCRA. Storing waste in a TU provides the greatest flexibility for design and operation of the storage unit. A temporary storage unit may be established for containers or tanks and may be placed either within or outside an AOC. A TU's major advantage is that IDW may be stored for up to one year, and waste may be removed from the TU and placed back into the AOC for treatment or disposal without triggering LDRs or MTRs. TUs must be administratively created with regulatory agency input. Design of a TU must consider:

- Length of time the unit will operate
- Type of unit
- Volumes of wastes to be managed
- Physical and chemical characteristics of the wastes to be managed there
- Potential for releases
- Hydrogeological and other relevant environmental conditions at the facility that may influence the migration of any potential releases
- Potential for exposure of humans and environmental receptors if releases were to occur

Specific design and operating requirements for accumulation storage areas and permitted storage units may be used as guidelines in developing temporary storage units. It is important to determine whether the TU will reside within an AOC, and the specific AOC should be identified in site-specific plans for the TU.

6.3 Accumulation of Containers for Less Than 90 Days

Generators may accumulate RCRA hazardous waste in container storage areas or storage tanks for up to 90 days before shipment to an offsite management facility. These storage areas and tanks are commonly called accumulation storage units. This storage option is somewhat flexible in terms of design due to the limited storage time involved. However, 90 days is not always sufficient to adequately characterize the waste before shipment offsite. This storage option is inappropriate for long-term storage of IDW.

Accumulation container storage areas must meet specific design and operational requirements outlined in 40 CFR §262.34(a) and R.61-79.262 Subpart C, which include the following:

- Containers must be in good condition and compatible with the waste placed inside them.
- Containers must be kept closed, except when waste is being added or removed from them, and they must be managed in such a way as to prevent rupture or leakage.
- Containers must be marked as hazardous waste and with the accumulation start date, composition and physical state of the waste, hazardous properties of the waste, and the name and address of the generator.
- Inspection of the accumulation storage unit must be conducted and recorded at least weekly.
- Personnel handling the containers must receive initial and annual training on operating and maintaining the accumulation storage unit.
- A contingency plan must be developed and emergency equipment provided for the accumulation storage unit.

- The accumulation storage unit must be closed to meet the RCRA closure performance standard.

In addition to these requirements. E/A&H recommends providing the following measures when possible:

- If the accumulation storage unit is not within the AOC, the unit should be constructed with a concrete or asphalt base, depending on the type and quantity of waste stored, and should have berms around the perimeter. Existing concrete and asphalt pads often are appropriate for storage.
- The accumulation storage unit should be covered, or adequate capacity should be provided to handle runon and precipitation.
- Liquids from runon, precipitation, or spills should be collected promptly from the accumulation storage unit and managed appropriately.

Accumulation storage units do not require administrative action to create; the generator simply must establish the storage area and maintain adequate documentation demonstrating compliance with the operating requirements.

6.4 Storage of Containers to Meet Permitted Facility Standards

The last storage option for IDW is to use an existing permitted storage facility or create a storage area meeting all the design specifications and operating requirements applicable to permitted facilities. The requirements for permitted facilities were developed to allow longer storage of a variety of wastes generated at industrial facilities, and these requirements are the most stringent under RCRA. Unless using an existing permitted storage facility, this option provides the least amount of flexibility because the requirements are extensive and very specific. However, this option also provides the greatest amount of storage time, with no pre-established limits on time a waste may be stored. While CERCLA allows onsite storage units of this type to be exempt from permitting standards, the substantive requirements still must be met. These requirements for container storage areas are summarized below:

- General Standards
  - Waste analysis plan for characterizing each hazardous waste stored at the facility
  - Facility security
  - Location standards for flood zones and seismically sensitive areas
  - Annual personnel training

- Emergency Preparedness
  - Develop a contingency plan for emergencies
  - Provide adequate communication and alarm systems for emergencies
  - Personnel training in emergency response
  - Procedures for managing ignitable, reactive, and incompatible wastes

- Design
  - Impermeable containment base free of cracks and gaps
  - Containment adequate for 10 percent of total waste capacity or largest container, whichever is greater
  - Additional containment adequate to contain a 25-year, 24-hour storm event, or a method to prevent runon and runoff of storm water and precipitation

- Operation
  - Weekly inspections
  - Removing accumulated liquids in the containment system within 24 hours
  - Separating incompatible wastes

- Closure
  - Develop closure plan subject to agency approval
  - Oversight by independent registered professional engineer
  - Certify to regulators the adequacy of closure

6.5 Inspections and Storage Inventory Log

All storage areas (TU, 90-day accumulation, and units meeting permitted facility standards) should be inspected at least weekly. A standard inspection form is included in Appendix C which shows the items to be inspected, discrepancies noted, and corrective actions taken. Container storage inspections should cover the following areas:

- Condition of containers
- Adequacy and completeness of labels
- Evidence of leaks and spills
- Adequate aisle space
- Loading and unloading areas
- Emergency equipment

In addition to completing weekly inspections, an inventory of containers should be maintained that reflects the following information:

- Number of containers currently in storage
- Date each container was generated
- Dates, manifest numbers, and destination facilities for IDW shipped to offsite management facilities
- Dates and disposition information for IDW disposed of onsite

Inventory information for small quantities of IDW may be maintained in the field logbook for the site. An inventory log may be used to track larger quantities of IDW from multiple sites. An inventory form is included as Appendix D. Inventory information should be updated at least weekly, and the inventory should be physically checked against the containers in storage at the time of inspection.

6.6 Container Labeling

Identifying marks and labels will be required on each waste container. The generating personnel must clearly mark each container with contrasting lettering. All empty drums will be marked as empty to avoid question of their contents. E/A&H has instituted the use of CERCLA IDW labels as shown in Figure 6-1. These labels will provide the base personnel with all the pertinent information they need to complete the inspection records state and federal regulations require. The labels will show the site location, date media was introduced in the drum, location designator, and type of media. Each location designator will be composed of five to six characters, the first two will represent the site identification number at NAS Pensacola (for example "30", represents site 30). The third character represents the waste origin (for example "S" for soil boring, "G" for monitoring well). If the monitoring well is temporary, the fourth digit will be used for the temporary designation of "R." The fourth digit may also designate the depth of the permanent monitoring well (i.e., "S" for shallow, "I" for intermediate, "D" for deep). The fourth and fifth characters may represent the matrix serial identification number, which is a unique location number assigned to the origin. For example a drum of purge water collected from Site 30, shallow monitoring well number 12 would have the location designator 30GS12. These labels will be filled out by the E/A&H personnel on the specific site and attached to the full and sealed drums. Drum labels will be placed on the side of the drum, not on the lid, to reduce weathering and to prevent the possibility of interchanging labels if lids are reused. If labels are not available, the following action will be accepted: The drums containing waste will be marked with a contrasting paint pen or grease pencil as CERCLA IDW, identifying the site location, date media was introduced in the drum, location designator, and type of media to allow the appropriate analysis to be traced to the correct drum of waste. All old markings on recycled drums shall be painted over with black spray paint to avoid confusion with the new labels or markings.

All labeling information for each drum will be entered into the field logbook. After the drum's contents are characterized, as described in Section 4, the labels will be updated to reflect the

Figure 6-1 Drum Label

[redacted]

NAVY CLEAN
ENSAFE/ALLEN
& HOSHALL

ENSAFE/ALLEN & HOSHALL
5720 SUMMER TREES DR. SUITE 8
MEMPHIS, TENNESSEE 38134
(901) 383-9115

SITE ______________________ **DATE** ______________________

LOCATION
DESIGNATOR ________________ **MEDIUM** ______________________

appropriate classification of wastes and the logbook will be updated. Drums containing hazardous IDW will be labeled using a paint pen or grease pencil "HAZARDOUS WASTE - Florida Law Prohibits Improper Storage or Disposal" in accordance with 40 CFR Part 172 and the applicable state regulations. Drums containing non-hazardous IDW will be labeled using a paint pen or grease pencil "NON HAZARDOUS WASTE".

6.7 Use of Portable Storage Tanks

Portable storage tanks often are used to accumulate and store liquid IDW such as groundwater or storm water runoff. USEPA regulates these portable tanks as containers for storage onsite. Storage tanks should be labeled in the same manner as for containers. However, the portable tanks must comply with federal Department of Transportation (DOT) specification and labeling if they will be used to transport liquids to offsite facilities.

6.8 Repackaging and Overpacking Containers

Repackaging or overpacking containers may become necessary if they become damaged or weathered and no longer are suitable for use. Repackaging involves transferring the waste from the damaged drum into a new container, whereas overpacking involves placing the damaged drum into a larger container. When repackaging or overpacking occurs, the new container must be labeled identically, and a note should be made in the field logbook or storage inventory log of the change in packaging or drum size.

7.0 TREATMENT AND/OR DISPOSAL OF IDW

The Navy as *"Generator"* of the waste retains all responsibility for disposal of the containerized waste. The Navy disposes of its hazardous waste in accordance with NAS Pensacola Instruction 5090.1B *Hazardous Waste Management Program* (NAS Pensacola 1994).

Once the IDW has been characterized, treatment and disposal options that appropriately manage the waste may be considered. The options available at a particular installation depend on:

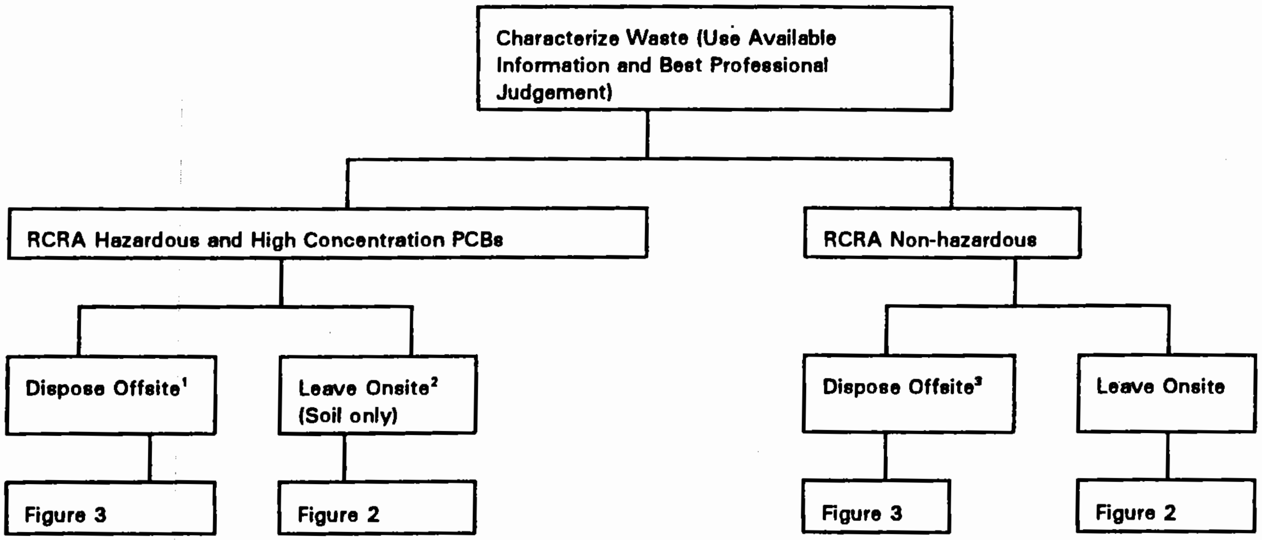
- Availability of onsite management facilities, such as industrial wastewater treatment plants, NOTWs, bioremediation facilities, and other treatment technologies that may have been developed for other cleanup sites.

- Availability of a POTW with the capability to treat wastewater from the installation.

- Site conditions and regulatory approval for disposal of non-hazardous soil back onto the site where generated.

A decision tree for selecting the best approach for IDW management is provided in Figure 7-1, 7-2, and 7-3. If the IDW is to remain onsite, then the onsite branch, Figure 7-2, shows the steps and choices for the different types of IDW. If the IDW is to leave the site, the offsite branch, Figure 7-3, shows the steps and choices for the different types of IDW. The waste management options addressed in this section include managing aqueous wastes at installation wastewater treatment plants, NOTWs, and at POTWs. Solid IDW may be disposed of at an offsite facilities or returned to the site from which it was generated. In addition, IDW may be used onsite in pilot-scale treatability studies.

Figure 7-1
IDW Management Decision Tree



Source: Modified from USEPA 1991

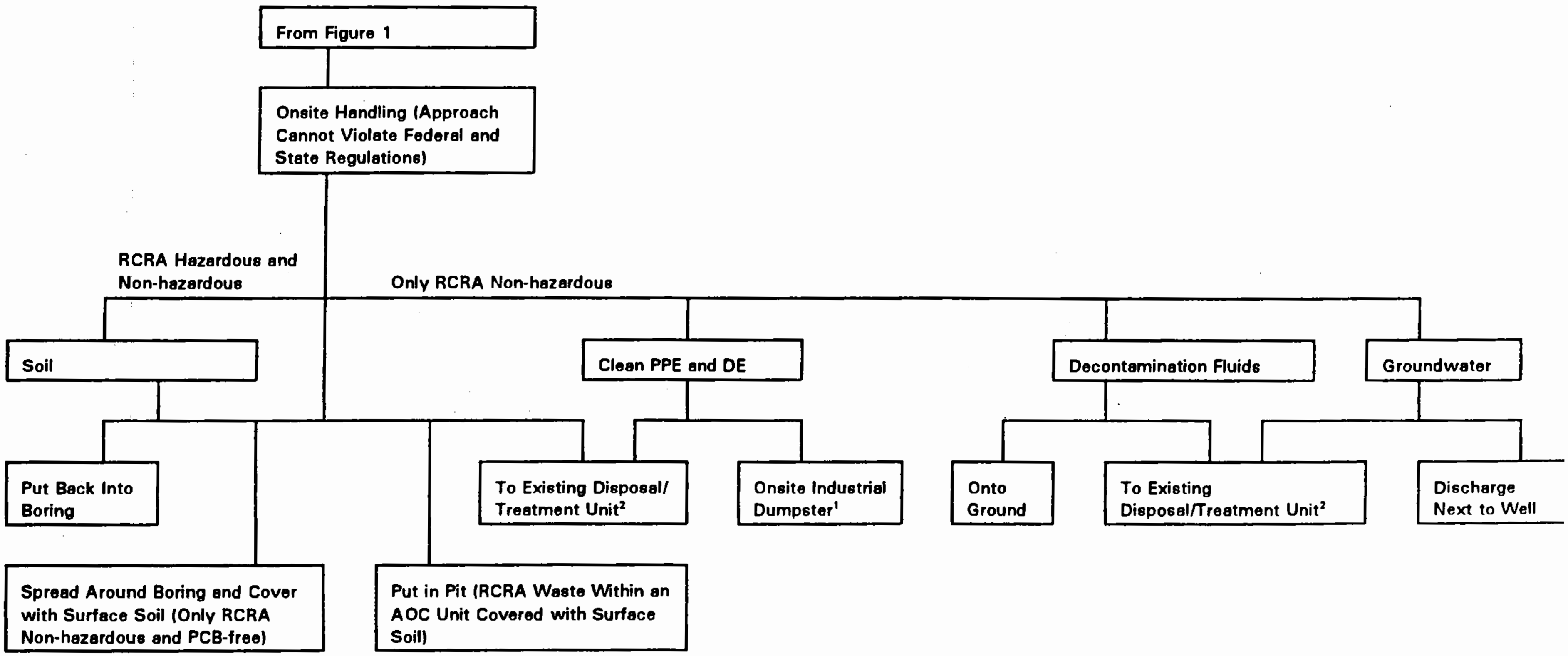
Notes:

1 Soil cuttings, groundwater, and decontamination fluids creating increased hazards should be disposed of offsite.

2 If not prohibited by other legally enforceable requirements such as state ARARs

3 Justified only when a RCRA non-hazardous waste is a state hazardous waste and state requires waste removal, or if leaving the waste onsite would significantly affect human health and the environment

Figure 7-2
Onsite Handling of IDW

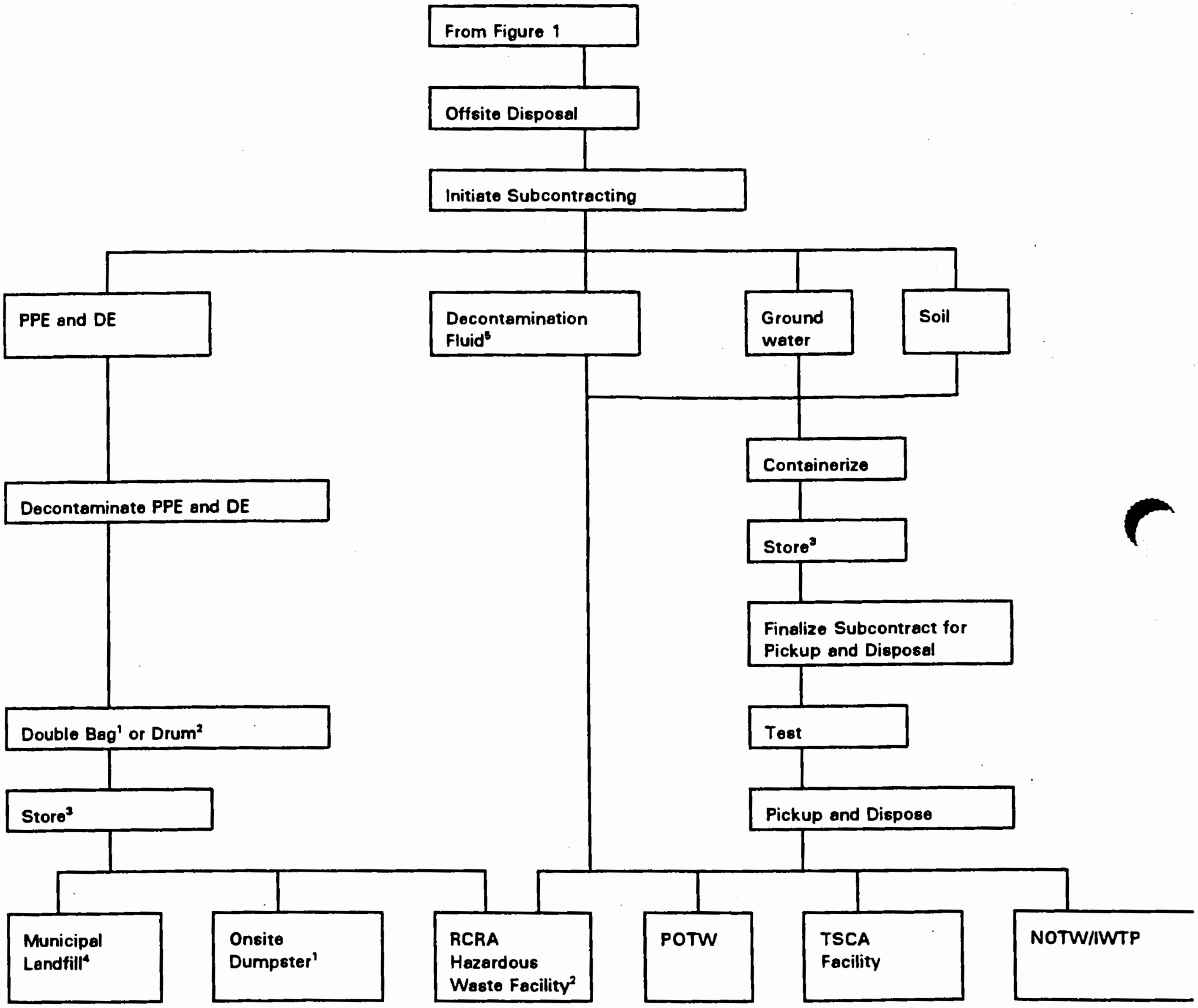


Source: Modified from USEPA 1991

Notes:

1 Clean PPE and DE may also go to the nearest landfill
2 If the receiving unit meets the offsite policy acceptability criteria

Figure 7-3
Offsite Handling of IDW



Source: Modified from USEPA 1991

Notes:

1 Only RCRA non-hazardous waste
2 Only RCRA hazardous waste generated in quantities greater than 100 kg/month when sent offsite
3 In accordance with accumulation requirements for RCRA hazardous wastes
4 Only if the conditionally exempt small quantity generator exception applies
5 If the conditionally exempt small quantity generator exception applies, offsite disposal of decontamination fluids may not require subcontracting

7.1 Offsite Handling

Offsite handling of IDW would involve using a subcontractor to haul and dispose of the IDW at an offsite facility which complies with the applicable regulations for the type of waste. Generally, this approach allows for the most technologically advanced disposal option. However, there are several disadvantages to offsite handling which include:

- increased costs
- loss of control over the fate of the IDW while retaining liability
- potential for spills during transportation
- finding a suitable disposal facility
- reluctance of states to accept waste generated out-of-state

7.1.1 Management of Aqueous Liquids at Installation Treatment Plants

Aqueous liquids such as well purge water, well development water, and decontamination liquids often can be treated at available installation wastewater treatment plants. Based on the completed waste profile, the IDW can be evaluated to determine if it meets the acceptance criteria under the wastewater treatment plant's discharge permit. This evaluation usually consists of comparing the waste contaminants to the chemical constituents the plant is permitted to manage. Accepting and discharging the IDW to the wastewater treatment plant typically is coordinated with the installation environmental coordinator and plant personnel. If the waste is restricted under the LDR program, a special notification must be completed and submitted to the wastewater treatment plant when the waste is transferred (40 CFR §268.7[1[[6]). A certificate of disposal or their receipt should be obtained from the wastewater treatment plant after the IDW has been accepted, and this document should be filed with the waste profile, along with a copy of the LDR notification.

In addition to IWTPs, NOTWs are permitted to accept wastewater for treatment. However, NOTWs may be subject to different regulations. If this option is selected for use, notification and coordination with Base environmental personnel will be required.

7.1.2 Management of Aqueous Liquids at POTWs

Many POTWs are permitted to accept wastewater for treatment under special discharge permits issued for occasional or one-time discharges. These permits may often be obtained with the data used to complete the waste profile. The process of obtaining a special discharge permit is more formal than obtaining approval; however, the turnaround time for approval is typically just two to four weeks. If the waste is restricted under the LDR program, a special notification must be completed and submitted to the POTW when the waste is shipped or transferred (40 CFR §268.7[a][6]). A certificate of disposal or other receipt should be obtained from the POTW after IDW has been accepted, and this document should be filed with the waste profile, along with copies of the LDR notification.

7.1.3 Use of Investigation-Derived Waste in Pilot-Scale Treatability Studies

IDW may often be used beneficially onsite in pilot-scale treatability studies. At the federal level, samples undergoing treatability studies at laboratories and testing facilities are exempt from hazardous waste regulation, as long as USEPA and the Florida Department of Environmental Protection (FDEP) are notified and certain record-keeping and management standards are met (40 CFR 261.4[e] and [f]).

Before conducting a treatment study, any IDW intended for such use should be stored in accordance with applicable regulation, in properly labeled and marked containers.

7.2 Onsite IDW Handling and Management Options

Onsite handling of IDW is a cost effective approach to handling IDW. If IDW is RCRA non-hazardous soil or water, it may be left onsite unless a state ARAR or community concerns, require offsite disposal. IDW to be left onsite should not be containerized or tested. The onsite handling options for RCRA non-hazardous IDW are listed below.

- Soil
  - Spread around the well
  - Return to boring
  - Put the IDW into a pit within the AOC
  - Dispose at the site's TDU

- Groundwater
  - Pour onto ground next to well
  - Dispose at the site's TDU

- Decontamination Fluids
  - Pour onto ground
  - Dispose at the site's TDU

- Decontaminated PPE and DE
  - Double bag and dispose at the site, or in an municipal landfill
  - Dispose at the site's TDU

If the IDW is RCRA hazardous soil that poses no immediate danger to human health and the environment, it may remain onsite within the delineated AOC. Proximity to residents and workers must be considered before using this disposal option. Onsite disposal of RCRA hazardous soil involves:

- Delineating the AOC
- Determining pit locations close to the borings within the AOC
- Covering hazardous IDW in the pits with the surficial soil

8.0 IDW MANAGEMENT ORGANIZATION

The Navy will have ultimate authority and responsibility for managing and disposing of the IDW E/A&H generates on its behalf. Interim status for hazardous waste container storage facilities on the military base has been granted under RCRA statues and regulations. This allows all wastes to be managed in accordance with subtitles C and D of RCRA and with the state solid waste regulations. The Navy, E/A&H, and subcontractor personnel will implement the IDW management plan. E/A&H and its subcontractor personnel will be responsible for properly containerizing and labeling the waste and collecting samples for laboratory analysis. The Navy will be responsible for managing the waste inventory at waste accumulation areas, laboratory analysis, characterizing the waste as hazardous or non-hazardous (after analytical information is returned from the laboratory), loading of waste for offsite transfer, and for the transporting the waste to a properly permitted waste management facility.

8.1 E/A&H Site Manager

The E/A&H site manager will be responsible for properly containerizing IDW including:

- Notifying the site IDW coordinator of any new waste.
- Properly labeling the containers per Section 6 of this plan when accumulation is initiated.
- Establishing IDW accumulation area(s) at each site.

8.2 E/A&H IDW Coordinator

The E/A&H IDW coordinator will be responsible for assisting the Navy in managing IDW accumulation areas and accumulation areas associated with the investigation, however the Navy will retain ultimate responsibility for the waste management system. His responsibilities include:

- Supervising daily waste management at all generating points.
- Ensuring hazardous waste containers are properly labeled and stored in an appropriate manner and incompatible waste are segregated.
- Maintaining drum inventory logs or forms.
- Ensuring overall compliance with this plan.

8.3 Navy Environmental Coordinator (IDW Manager)

The Navy manages the hazardous waste in accordance with NAS Pensacola Instruction 5090.1B *Hazardous Waste Management Program* (NAS Pensacola 1994). The Navy environmental coordinator (IDW manager) will be responsible for the entire IDW management system. He will be responsible for informing E/A&H IDW Coordinator of any changes in procedures or policy concerning the handling, storage, and disposal of IDW.

9.0 REFERENCES

Naval Air Station Pensacola. (1994). *NASP Instruction 5090.1B Hazardous Waste Management Program.* Naval Air Station Pensacola: Pensacola, Florida.

U.S. Environmental Protection Agency (1986). Test Methods for Evaluating Solid Waste, Third Edition SW-846. Prepared by the Office of Solid Waste and Emergency Response.

U.S. Environmental Protection Agency (1988a). *Guidance for Conducting Remedial Investigation and Feasibility Studies under CERCLA, Interim Final.* Prepared by the Office of Emergency and Remedial Response.

U.S. Environmental Protection Agency (1988b). *CERCLA Compliance with Other Laws Manual, Draft Guidance.* Prepared by the Office of Emergency and Remedial Response.

U.S. Environmental Protection Agency. (1990). *National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule.* USEPA/540/1-89/002. December 1989. Federal Register V55:46 pg 8666-8865, March 8, 1990.

U.S. Environmental Protection Agency (1991). *Management of Investigation-Derived Wastes During Site Inspections.* Prepared by the Office of Emergency and Remedial Response, Publication 9345.3-02FS.

U.S. Navy. (1993). *1994 Site Management Plan (SMP) of the Installation Restoration Program for the Naval Air Station Pensacola*, Pensacola, Florida.

Appendix A
Sampling and Analysis Procedures

1.0 IDW SAMPLING METHODS

The basic objective of the IDW sampling program is to produce a set of samples representative of the IDW media under investigation and suitable for subsequent analysis. This attachment describes the methods and materials to be used for sampling IDW generated at Navy installations. Under many circumstances, the sampling and testing performed for the investigation will be sufficient to classify the IDW and no additional sampling will be necessary. When additional sampling is required to characterize the waste, it is important that quality control (QC) sampling is performed to assess the accuracy and precision of the sampling program. QC sampling methods should be the same as those stated in the approved work plan.

Sampling accuracy is usually achieved by using a random sampling technique. Sampling precision is achieved by collecting the appropriate number of samples and by maximizing the physical size of the samples.

A simple random sampling strategy will be employed for most solid waste cases where it is determined additional samples are required to characterize the IDW. The rationale for using this type of sampling method is that typically little or no information is known about the distribution of the chemical contaminants within the waste. For most solid IDW, distinct strata within the containers are not identified and various in composition or stratification may have occurred at unknown and random depths.

Simple random sampling is a type of probability sampling relying on mathematical and statistical theories. In simple random sampling all locations or portions of the IDW have an equal chance of being sampled. For simple random sampling, the appropriate number of samples to be collected is estimated by finding the regulatory threshold (RT) for the contaminants of concern and by estimating the sample mean (x) and variance (s).

Simple random sampling may be used for liquid IDW thought to be homogeneous. Stratified random sampling may be used for liquid IDW sampling where the contaminants of concern are thought to stratify due to their density relative to the other liquids. Stratified random sampling is different from simple random sampling in that the Xs are calculated for each stratum in the population and then integrated into the overall estimates of those statistics. Systematic random sampling may also be used for instances where there are recognized trends or cycles associated with the contaminants in the IDW. Cases where systematic random sampling may be used include drums with floating or sinking products.

It is also likely that if the waste is to be disposed of to a treatment, storage, or disposal unit (TSDF), the TSDF's operators will want to perform their own waste characterization. Therefore, it is important to contact the potential TSDF before performing sampling and laboratory analysis of the IDW to avoid duplication of efforts and costs. Potential TSDFs for the IDW should be contacted following environmental sampling. Their requirements regarding acceptable laboratory analyses change as do the wastes that they are accepting and the rates that they charge. Transportation requirements and costs should be determined before shipping.

The sampling method selected for each of the IDW media will, in part, depend on the potential contaminants of concern as shown by site history or analytical results of the field sampling program. The generation of additional decontamination fluids through IDW sampling should be minimized and should be a factor considered in the final choice of sampling technique. Care should be exercised to avoid using sampling devices plated with chrome or other materials that might contaminate the sample.

The description of sampling methods for containerized media is divided into three sections that address (1) soil and sludge, (2) containerized liquid, and (3) containerized PPE. If required, wipe sampling will be used to analyze the surface of drums, DE, and PPE.

1.1 Soil and Sludge Sampling

Available options for sampling devices suitable for soil and sludge (or sediment) sampling include scoops, thin-walled tube samplers, hand augers, and core samplers. The use of a scoop and a 100 centimeters (cm) long sampling trier is the recommended method for sampling containerized soil and sludge. However, site-specific conditions may necessitate a variety of sampling options, and therefore all of these sampling methods will be discussed. The presence of rocks, debris, or other sampling-specific considerations may complicate sampling and preclude the use of or require modification to some of these sampling devices.

When sampling a previously sealed vessel, the presence of a bottom sludge should be checked. This is easily accomplished by measuring the depth to apparent bottom and then comparing it to the known interior depth. Methods for sampling a bottom sludge are described in the following sections. Sludge developing in 55-gallon drums can also be collected by employing glass tubes used for the liquid portion of the sample.

1.1.1 Shovel, Spades, and Scoops

Collection of soil and sludge samples can be accomplished with tools such as spades, shovels, and scoops. The recommended and most direct method of collecting surface samples for subsequent analysis is with the use of a spade and scoop. This method is limited somewhat to sampling at the near surface. Samples from depths greater than 50 cm may become very labor-intensive. Samples collected for volatile organic compound (VOC) analysis will be placed directly into the analytical bottle. Samples collected for other analyses will be composited in a stainless steel bowl and then placed into the analytical bottles.

1.1.2 Thin-Walled Tube Sampler and Hand Corers

The thin-walled tube sampler is, as its name implies, a metal tube generally 2.5 to 7.5 cm in diameter and 30 to 60 cm long. The tube is forced into the soil or sludge and then extracted. Friction will usually hold the sample material in the tube during extraction. A variety of interchangeable cutting tips facilitates penetration with reduced sample disturbance. Thin-walled tube samplers are available in various types and construction materials and are suitable for moist, dry, sandy, or heavy-duty applications.

Sampling soil or sludge can also be accomplished with a hand corer. This device is essentially the same type of thin-walled tube sampler described above. It is modified by the addition of a handle to facilitate driving the corer and a check valve on top to prevent washout during retrieval through an overlying water layer. Hand auguring devices can be used in conjunction with a thin-walled tube sampler. In this manner, a thin-walled tube sampler can be used to sample both from the surface or to the bottom of a 55-gallon drum. However, the presence of rocks or the collapse of the auger hole generally prohibits sampling at depth.

1.2 Aqueous Liquid Sampling

Beakers, glass tubes, bailers, and extended bottle samplers and composite liquid waste samplers (COLIWASA) are potential devices used to sample containerized liquid media. Site-specific conditions may necessitate a variety of sampling options, and therefore all of these methods will be discussed. Samples from drums can also be readily collected by merely submerging a sample bottle.

1.2.1 Beakers

The use of a sampling device such as a beaker, either disposable or constructed or glass, Teflon, or stainless steel, is the recommended method for sampling containerized liquids. The device typically has a capacity of at least 500 milliliters (ml) to provide an adequate sample volume for analysis and to minimize the number of times the liquid will be distributed, thus reducing agitation of any sediment layer. Large sample volumes required for some analyses will require submerging the beaker several times to obtain the appropriate volume. A stainless steel beaker with pour spout and handle works well. It is easily cleaned and considerably less expensive than Teflon.

1.2.2 Bailers

Liquid samples from open containers, such as 55-gallon drums, may be collected. Bailers may also be used to collect liquid samples from containers such as drums or tanks. The major disadvantages to using bailers are splash hazards, and the need for decontamination of reusable bailers, and the generation of waste when using disposable bailers.

1.2.4 Composite Liquid Waste Samplers

The composite liquid waste samplers (COLIWASA) is designed to permit representative sampling of the complete water column from drums or other containerized liquid media. This type of sampler is used when contaminants of different densities such as oil and water are potentially present in the containerized liquid. It consists of a 152-cm long by 4-cm ID section of tubing with a neoprene stopper at one end. The stopper is attached to a rod running the length of the tube and terminating with a locking mechanism at the other end. Manipulation of the locking mechanism opens and closes the sampler by raising and lowering the neoprene stopper. The major drawbacks associated with using the COLIWASA include the difficulty of decontamination and cost. The sampler is difficult to decontaminate in the field and high in cost relative to alternative procedures such as glass tubes. The COLIWASA should only be used when multiphase wastes are suspected.

1.3 Wipe Sampling

Wipe samples are used to assess surface pesticide/PCB contamination and are applicable for the analysis of drums containing used PPE and DE. The terms "wipe sample," "swipe sample," and "smear sample" have all been used synonymously. For purposes of this section, the sample will be termed "wipe sample". Wipe samples will adhere to requirements for soil sample preservation and holding times. Wipe samples will be collected in accordance with the following procedures.

Before Sampling:

1. Don personal protective equipment as required in the site-specific HASP.
2. Mark the 10-cm sample site with a decontaminated template or a ruler.
3. Write a detailed description of the area to be sampled including a sketch of the sampling area in the field logbook.
4. Prepare all sampling equipment for the sampling event.

During Sampling:

5. Remove the cap from the sampling vial.

6. Remove the hexane- or deionized water-soaked gauze or swab from the sampling vial with stainless steel forceps or tongs.
7. Immediately begin wiping the sampling area twice, from left to right and then from top to bottom.
8. Return the gauze or swab to the sample vial. If using a gauze, fold the gauze so the side used in sampling is not exposed.
9. Cap the sample vial.

After Sampling:

10. Label the vial and record the sampling details on the sampling forms. Complete the chain-of-custody forms in accordance with Section 12 of the CSAP.

QA/QC samples will be collected at the frequency presented in Section 15 of the CSAP. In addition, a hexane- or deionized water-soaked gauze will be submitted as a QA sample.

Appendix B

Waste Profile Forms and Instruction

PROFILE NUMBER____________
Completed by____________
Date____________
Reviewed by____________

INVESTIGATION-DERIVED WASTE PROFILE

Complete one form for each waste stream generated at each site. See instructions attached for detailed information about this form.

GENERATOR INFORMATION

Facility Name ____________
Site Name ____________
Address ____________
____
City ________ State ___ Zip ________

USEPA ID Number____________
Technical Contact ____________
Phone ____________
Fax ____________
CTO Number____________

WASTE DESCRIPTION

Waste Description____________
Source Code/Process ____________
Waste Form Code/Category of Waste ____________
Special Handling Instructions____________
Is this waste regulated by USEPA or FDEP? ________ Waste codes ________ CLIN________
LDR Subcategory ________ ________ ________ ________
Numerical Standard per §268.41? ________ ________ ________ ________
Numerical Standard per §268.43? ________ ________ ________ ________
Technology-Based Standard §268.42? ________ ________ ________ ________

TRANSPORTATION INFORMATION

DOT Proper Shipping Name____________
DOT Hazard Class____________ UN/NA________ RQ________
Packaging Description ____________

PHYSICAL PROPERTIES

Color ____________
Odor ____________

Liquid Layering ____________
Physical State ____________

	Avg.	Min.	Max.
pH	____	____	____
Specific Gravity	____	____	____
Flash point	____	____	____
(Method):	____	____	____
BTU/lb	____	____	____

Viscosity ____________
Yard-Pound Factor ________ % YD = LB
% Halogens ____________
% Liquid ____________
% Sludge ____________
% Solid ____________
% Water____________

Acid Reactive	Y	N	Biological	Y	N	Corrosive	Y	N
Dioxin	Y	N	Explosive	Y	N	Flammable	Y	N
Oxidizer	Y	N	Pesticide	Y	N	Herbicide	Y	N
Poison	Y	N	Pumpable	Y	N	Pyrophoric	Y	N
Radioactive	Y	N	RCRA Reactive	Y	N	Shock Sensitive	Y	N
Wastewater	Y	N	Water Reactive	Y	N	Other ________		

TOXICITY CHARACTERISTICS

USEPA Waste Code	Contaminant	Level (mg/L)	Federal Regulated Level
	Aldrin	______	
	Antimony	______	
D004	Arsenic	______	5.0
	Asbestos	______	
D005	Barium	______	100.0
D018	Benzene	______	0.5
	Beryllium	______	
D006	Cadmium	______	1.0
D019	Carbon Tetrachloride	______	0.5
D020	Chlordane	______	0.03
D021	Chlorobenzene	______	100.0
D022	Chloroform	______	6.0
D007	Chromium (Total)	______	
	Chromium (Trivalent	______	
	Chromium (Hexavalent)	______	
	Cobalt	______	
	Copper	______	
D023	o-Cresol	______	200.0
D024	m-Cresol	______	200.0
D025	p-Cresol	______	200.0
D016	2,4-D	______	10.0
	DDT, DDE, DDD	______	
D027	1,4-Dichlorobenzene	______	7.5
D028	1,2-Dichloroethane	______	0.5
D029	1,1-Dichloroethylene	______	0.7
	Dieldrin	______	
D030	2,4-Dinitrotoluene	______	0.13
	Dioxin (2,3,7,8, - TCDD)	______	
D012	Endrin	______	0.02
	Fluoride salts	______	
D031	Heptachlor (& its epoxide)	______	0.008
D032	Hexachlorobenzene	______	0.13
D033	Hexaclorobutadiene	______	0.5
D034	Hexachloroethane	______	3.0
	Ketone	______	
D008	Lead	______	5.0
	Lead components, organic	______	
D013	Lindane	______	0.4
D009	Mercury	______	0.2
D014	Methoxychlor	______	10.0
D035	Methyl ethyl ketone	______	200.0
	Mirex	______	
	Molybdenum	______	
	Nickel	______	
D036	Nitrobenzene	______	2.0
D037	Pentachlorophenol	______	100.0
D038	Pyridine	______	5.0
D010	Selenium	______	1.0
D011	Silver	______	5.0
D039	Tetrachloroethylene	______	0.7
	Thallium	______	
D015	Toxaphene	______	0.5
D017	2,4,5-TP (Silvex)	______	1.0
D040	Trichloroethylene	______	0.5
D041	2,4,5-Trichlorophenol	______	100.0
D042	2,4,6-Trichlorophenol	______	2.0
	Vanadium	______	
D043	Vinyl chloride	______	0.2
	Zinc	______	
	PCB	______	

TOTAL METALS

Metals (ppm)	Avg.	Min.	Max.
Aluminum	___	___	___
Antimony	___	___	___
Arsenic	___	___	___
Barium	___	___	___
Beryllium	___	___	___
Cadmium	___	___	___
Chromium VI	___	___	___
Chromium III	___	___	___
Cobalt	___	___	___
Fluoride	___	___	___

Metals (ppm)	Avg.	Min.	Max.
Iron	___	___	___
Lead	___	___	___
Mercury	___	___	___
Molybdenum	___	___	___
Nickel	___	___	___
Selenium	___	___	___
Silver	___	___	___
Thallium	___	___	___
Vanadium	___	___	___
Zinc	___	___	___

CHEMICAL COMPOSITION

Chemical Name	Avg.	Min.	Max.	Circle one:
________________	___	___	___	% PPM PPB
________________	___	___	___	% PPM PPB
________________	___	___	___	% PPM PPB
________________	___	___	___	% PPM PPB
________________	___	___	___	% PPM PPB
________________	___	___	___	% PPM PPB
________________	___	___	___	% PPM PPB
Water	___	___	___	% PPM PPB

ADDITIONAL INFORMATION AND COMMENTS

Attached documentation: ____

____

____

____

____

____

____

____

____

GENERATOR CERTIFICATION

I hereby certify, as an authorized representative of the generator named on Page w of this Waste Profile, that the information provided in this and all attached documents is true and correct; reveals any and all known or suspected hazards involving the handling, transportation, treatment, storage and disposal of this waste; and no willful misrepresentations or omissions have been made. I further certify and warrant that this identification is the result either of an analysis of a representative sample obtained and analyzed in accordance with the sampling and testing procedures specified by the U.S. Environmental Protection Agency or by applying knowledge of the process generating the specific waste being offered.

Generator's Signature ______________________ Title ______________________ Date ____________

Instructions for Completing the Investigation-Derived Waste Profile

1. *General Information*. The mailing address of the generator and the site where the waste will be picked up should be indicated. The USEPA Identification Number for the site must be provided, unless the generator is a conditionally-exempt small quantity generator.

2. *Waste Description*. This Section contains some general information about the waste, including how it was generated.

   USEPA hazardous waste codes are also included in this section. Waste codes are selected according to whether the waste contains any listed hazardous waste or whether the waste itself exhibits a characteristic of hazardous waste. There is a hierarchy for assigning waste codes which can be reviewed in detail in 40 CFR Part 261 of the federal hazardous waste regulation. Here's a simple explanation:

   a. If the remediation site is associated with a specific industrial process, first look under the K-code listing in 40 CFR §261.32 to determine if any of the generating processes match the activities previously conducted at the site. If so, the waste gets the K-code and go on to step "d" to assign characteristic codes. If the process is not described in the K-code list, go to step "b". There are very few specific industrial processes that would result in such IDW at Navy facilities.

   b. If the remediation site is associated with a non-specific industrial process that was not listed under the K-codes, look under the F-code listings in 40 CFR §261.31 to determine if any of the generating processes match the activity and contaminants at the site. If so, the waste gets the appropriate F-code, and then continue to step "d" to assign characteristic codes. If the process is not described in the F-code list, go to step "d". Some common F-code activities include use of solvents, wood treatment activities, and electroplating operations.

   c. If the remediation site is associated with the release of a commercial product, off-specification species or out-of-date product, look under the P-code and U-code listings in 40 CFR §261.33 for a match to the contaminants found at the site. P-code sates are acutely toxic, and U-code waste are listed for chronic toxicity, reactivity, or ignitability. A common activity which results in this type of waste is a pesticide storage area where containers were rinsed or where releases occurred. Don't forget to check the lists for common synonyms of the chemical. The CAS number may also be used to review the list of waste codes. If the waste does not match any of the chemicals in this list, go to step "J".

   d. If the waste doesn't fall into any of the categories listed above, you must consider the characteristic waste categories listed in 40 CFR Part 261. Subpart C. There are four categories of characteristics, known as D-code wastes: ignitable, corrosive, reactive and toxic. A waste may exhibit one or more of these characteristics. The only way to determine whether a waste is regulated as a characteristic waste is to take a sample and analyze it for the characteristic, or to use other analytical data to determine if it exhibits one or more characteristics. If the waste does not fall into any of the categories listed in steps "a" through "c" and does not exhibit a hazardous characteristic, it is not regulated as hazardous waste, although it may be regulated as designated waste.

      Characteristic waste codes regulated under federal regulations are assigned according to the type of characteristic exhibited.

3. *Transportation Information*. This section is for completing the proper U.S. Department of Transportation shipping name, hazard class and UN/NA number. In addition, the reportable quantity (RQ) for the waste is shown here. DOT information is available in 40 CFR Part 172, and RQ information is available in 40 CFR Part 302.

4. *Physical Properties*. Important physical characteristics are described in this section of the profile, including many of the characteristics to be used for verifying the waste identification when the waste is picked up by E/A&H's waste management contractor.

5. *Toxicity Characteristics*. This section of the profile contains a comprehensive listing of chemical constituents that are regulated by USEPA. Their corresponding D-codes are shown in the list, as is the regulated level for each chemical. This section of the form should be completed even if the waste is listed as a K-code, F-code, P-code or

U-code. It is usually based on an analytical report for the waste. If a sample will be collected for toxicity characteristic analysis, the constituents selected for analysis should be based on a review of available corresponding environmental data, known activities at the site, and possible management methods for the waste.

6. *Total Metals.* Information on total metals is usually required for waste streams requiring certain types of treatment. For example, an inorganic sludge that exhibits a toxicity characteristic for cadmium and lead (D006 and D008) may be chemically stabilized to meet LDR treatment standards before it is landfilled. Usually this type of treatment consists of "fixing" the waste in a concrete-like material. In order to ensure that the required USEPA treatment standards will be met, the treatment company needs information on the total quantity of cadmium and lead in the waste so that it can develop the proper "recipe" for the waste and stabilizer.

7. *Chemical Composition.* All the components of the waste are listed, along with a range of their concentration. It is important that the average concentrations add up to 100%, so that all the components are represented. A composition listing for a typical solvent/water waste stream is on the following page.

Chemical Name	Avg.	Min.	Max.	Conc.
Xylenol	3	2	4	%
Ethyl Acetate	5	4	6	%
Methanol	1	1	2	%
Ethanol	1	1	2	%
Hexone (Methyl Isobutyl Ketone)	1	1	2	%
Aliphatic Naphtha (carrier)	69	50	70	%
Water	20	10	55	%
Total Composition	100	N/A	N/A	%

8. *Additional Information and Comments.* This section is for explaining any special conditions or handling required for the waste. In addition, this section should list the supporting documentation attached to the profile to support the waste characterization.

9. *Generator Certification.* The generator certification should be signed by the environmental coordinator for the Navy installation where the waste is generated.

Appendix C
Sample Storage Area Inspection Form

ACCUMULATION STORAGE UNIT
GENERAL INSPECTION - WEEKLY

INSPECTED BY:______________________ ______________________ __/__/__ ______
Inspector' name (print) Signature Date Time

REVIEWED BY:______________________ ______________________ __/__/__ ______
Manager's name (print) Signature Date Time

EQUIPMENT/AREA	SAT	UNSAT	COMMENTS
FACILITY PROPER			
Evacuation Routes			
Access (Unobstructed)			
Emergency exits unlocked at start of day			
Pavement/curbing			
No evidence of leakage, spillage, or accumulated liquid .			
Access Road			
Access (Unobstructed)			
Condition (No holes, depressions, or debris)			
SECURITY DEVICES			
Fences			
Condition (No damage or corrosion).			
Gates			
Condition (No damage or corrosion)			
Operation (Swing or slide freely)			
Access (Unobstructed)			
Padlocks			
Present at each gate			
Operation			
Warning Signs			
Presence (Maximum 75 feet apart)			
Legibility (From a minimum 25 feet apart)			
SAFETY AND EMERGENCY EQUIPMENT			
Emergency Shower/Eye Wash Stations			
Adequate supply of eyewash solution			
Handle operation			
Water Pressure, volume, and flow			
Identification signs (Present, legible, and in satisfactory condition)			
Access (Unobstructed)			

Appendix D
Drum Inventory Form

EnSafe/Allen & Hoshall

Investigation Derived Waste: Drum Inventory

Project Name:			Project Number:		
Client:			Site No.:		
Survey Date:			Surveyor:		
	Boring/Well No.	Contents	Date Generated	# Drums	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

APPENDIX C

FORMS

EQUIPMENT REQUISITION

PROJECT: ____________ PROJECT NO.: ____________
PROJECT MANAGER: ____________ TODAY'S DATE: ____________
FIELD TECHNICIAN: ____________ DUE DATE: ____________
EQUIPMENT MANAGER: ____________ EST. RETURN DATE: ____________

LOCATION/
SHIP TO: ____________

☐ Do not bill TtNUS equipment daily through the sign-out period. Billing procedures to be followed are noted below.

☐ Apply Industrial Billing Rate

☐ Shipped by: ____________

☐ Apply Gov't Billing/Shipping Rates

☐ Load In: ____________

☐ Apply Other Billing Rates ____________

ID No.	EQUIPMENT	QUANTITY OUT	CONDITION OUT	QUANTITY IN	CONDITION IN	BILLING RATE	COMMENTS
	MONITORING EQUIPMENT						
	HNU/PID						
	HNu eV probe						
	Isobutylene Calibration gas						
	HORIBA water quality checker						
	pH 4 Calibration solution						
	Draeger pump						
	Draeger tubes						
	LEL/O2						
	Pentane Calibration gas						
	OVA/FID						
	Methane Calibration gas						
	Mini-alert Radiation meter						
	Conductivity meter						
	Thermometer						
	ORP meter						
	Span gas regulator						
	PPE						
	Latex Disposable Gloves (Size)						
	Viton Gloves						
	Butyl Gloves (Size)						
	Cotton Gloves						
	Nitrile Gloves						
	Neoprene Gloves						
	Silvershield Gloves (Size)						
	Butyl Rubber Boots						
	Neoprene Rubber Boots (Size)						
	Latex Disposable Boots (Size)						
	Hard Hat						

EQUIPMENT REQUISITION

PROJECT: ____________ PROJECT NO.: ____________

PROJECT MANAGER: ____________ TODAY'S DATE: ____________

FIELD TECHNICIAN: ____________ DUE DATE: ____________

EQUIPMENT MANAGER: ____________ EST. RETURN DATE: ____________

LOCATION/
SHIP TO: ____________

☐ Do not bill TtNUS equipment daily through the sign-out period. Billing procedures to be followed are noted below.

☐ Apply Industrial Billing Rate

☐ Shipped by: ____________

☐ Apply Gov't Billing/Shipping Rates

☐ Load In: ____________

☐ Apply Other Billing Rates ____________

ID No.	EQUIPMENT	QUANTITY OUT	CONDITION OUT	QUANTITY IN	CONDITION IN	BILLING RATE	COMMENTS
	Face shield						
	Tyvek Coveralls (Size)						
	PE Coveralls (Size)						
	Saranex Coveralls (Size)						
	PVC Coveralls (Size)						
	Safety Glasses - Clear / Tinted						
	Monogoggles						
	Earplugs						
	RESPIRATORY PROTECTION						
	Disposable Dust Mask						
	Ultra twins-full face (S / M / L)						
	MSA Cleaner Sanitizer II						
	Ultra Twin Cartridge (Type:)						
	Air escape packs						
	SCBA units w/ tanks						
	SCBA, spare tank						
	SCBA mask						
	WATER SAMPLING						
	Electronic water-level indicator (m-scope)						
	Popper						
	Oil/Water interface probe						
	Teflon Disposable Bailer						
	Stainless Steel Bailer						
	PVC disposable bailer						
	Polyrope 1000'						
	Peristaltic Pump						
	Silicon tubing						
	Teflon tubing	150'					
	0.45 micron filter						
	Teflon-coated stainless steel cable						

EQUIPMENT REQUISITION

PROJECT: ______________ PROJECT NO.: ______________
PROJECT MANAGER: ______________ TODAY'S DATE: ______________
FIELD TECHNICIAN: ______________ DUE DATE: ______________
EQUIPMENT MANAGER: ______________ EST. RETURN DATE: ______________

LOCATION/
SHIP TO: ______________

- [ ] Do not bill TtNUS equipment daily through the sign-out period. Billing procedures to be followed are noted below.
- [ ] Apply Industrial Billing Rate
- [ ] Shipped by: ______________
- [ ] Apply Gov't Billing/Shipping Rates
- [ ] Load In: ______________
- [ ] Apply Other Billing Rates ______________

ID No.	EQUIPMENT	QUANTITY OUT	CONDITION OUT	QUANTITY IN	CONDITION IN	BILLING RATE	COMMENTS
	PE tubing 3/4" x 100'						
	PE tubing 1/4" x 100'						
	PE tubing 1/4" x 1000'						
	Tygon tubing 3/8"						
	PACKAGING						
	Strapping tape						
	Clear tape						
	Duct tape						
	Aluminum foil						
	Class 9 Labels						
	Electrical tape						
	GENERAL						
	4 mil Plastic Roll (10' x 25')						
	Motorola 2-way radio						
	200' tape measure						
	Garbage bags, 20 gal						
	Garbage bags, 30-40 gal						
	Ziplock bags, 1 quart						
	Ziplock bags, 1 gallon						
	Paper towel						
	Spray paint						
	Caution tape						
	Vinyl flagging						
	Wooden Survey stakes						
	Survey pin flags						
	Tedlar bag						
	pH paper						
	medicine dropper						
	Bolt cutters						
	First-aid kit						

EQUIPMENT REQUISITION

PROJECT: ______________________ PROJECT NO.: ______________________

PROJECT MANAGER: ______________________ TODAY'S DATE: ______________________

FIELD TECHNICIAN: ______________________ DUE DATE: ______________________

EQUIPMENT MANAGER: ______________________ EST. RETURN DATE: ______________________

LOCATION/ ______________________

SHIP TO: ______________________

☐ Do not bill TtNUS equipment daily through the sign-out period. Billing procedures to be followed are noted below.

☐ Apply Industrial Billing Rate

☐ Shipped by: ______________________

☐ Apply Gov't Billing/Shipping Rates

☐ Load In: ______________________

☐ Apply Other Billing Rates ______________________

ID No.	EQUIPMENT	QUANTITY OUT	CONDITION OUT	QUANTITY IN	CONDITION IN	BILLING RATE	COMMENTS
	Paper towels						
	Eyewash						
	Toolbox						
	Thermometer						
	DECONTAMINATION EQUIPMENT						
	Bailer brush						
	Long handle decon brush						
	Liquinox detergent						
	Teflon wash bottle 500 mL						
	Spray bottle						
	Wash tub						
	5 gal. bucket						
	3 gal. poly sprayer						
	SOIL SAMPLING						
	Stainless steel trowel						
	shovel						
	Disposable trowel						
	stainless steel bowl (Size)						
	Stainless steel auger						
	Stainless steel threaded cross handle						
	WATER						
	Steam Distilled (5 gal cube)						
	Reagent grade 20 L						
	HPLC water						
	OTHER						
	Hermit 2000 Datalogger						
	Hermit 1000 Datalogger						
	Transducer 20						
	Transducer 50						
	RS232 cable						

EQUIPMENT REQUISITION

PROJECT: ____________________ PROJECT NO.: ____________________
PROJECT MANAGER: ____________________ TODAY'S DATE: ____________________
FIELD TECHNICIAN: ____________________ DUE DATE: ____________________
EQUIPMENT MANAGER: ____________________ EST. RETURN DATE: ____________________

LOCATION/
SHIP TO: ____________________

☐ Do not bill TtNUS equipment daily through the sign-out period. Billing procedures to be followed are noted below.

☐ Apply Industrial Billing Rate

☐ Shipped by: ____________________

☐ Apply Gov't Billing/Shipping Rates

☐ Load In: ____________________

☐ Apply Other Billing Rates ____________________

ID No.	EQUIPMENT	QUANTITY OUT	CONDITION OUT	QUANTITY IN	CONDITION IN	BILLING RATE	COMMENTS
	Printer						
	2" Teflon slug						
	4" Teflon slug						

UNDERGROUND UTILITY LOCATION

Date of Request : ____________________

BRE Project # : ____________________

BRE Job Name : ____________________

Job Location : ____________________

____

____

UNCLE NOTICICATION : ____________________
(REFERENCE # 12410)

Work Start Date : ____________________

UTILITY COMPANY	TICKET NUMBER	TELEPHONE NUMBER	DISPATCHER NAME	DATE CONTACTED	MEETING DATE	REMARKS
ELECTRIC :						
GAS :						
CABLE :						
WATER :						
SEWER :						
TELEPHONE :						

CLEAR.DOC

SOUTHERN DIVISION - NAVFACENGCOM
CERTIFICATE OF CONFORMANCE

Well Designation:______________________________ Responsible Professional: ______________________________

Site Name: ______________________________ Drilling Company: ______________________________

Date Installed: ______________________________ Driller:______________________________

Project Name: ______________________________ Project Number: ______________________________

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing			
Well Screen			
End Cap			
Drilling Fluid			
Drilling Fluid Additives			
Backfill Material			
Annular Filter Pack			
Bentonite Seal			
Annular Grout			
Surface Cement			
Protective Casing			
Paint			
Rod Lubricant			
Compressor Oil			

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Responsible Professional:____________________________________

DAILY ACTIVITIES RECORD

PROJECT NAME:		PROJECT NUMBER:	
CLIENT:		LOCATION:	
DATE:		ARRIVAL TIME:	
B&RE PERSONNEL:		DEPARTURE TIME:	
CONTRACTOR:		DRILLER:	

ITEM	QUANTITY ESTIMATE	QUANTITY TODAY	PREVIOUS TOTAL QUANTITY	CUMULATIVE QUANTITY TO DATE
Mobiliztion/Demobilzation (each)				
4.25-inch HAS Drilling (foot)				
Rotary Wash Drilling (foot)				
Split-Spoon Samples (each)				
Shelby Tube Samples (each)				
2-inch MW Installation (foot)				
6-inch Surface Casing (foot)				
MW Development (hour)				
MW Surface Completion (each)				
IDW Containerization (drum)				
Decontamination (hour)				
Stand-by (hour)				

COMMENTS:

APPROVED BY:

B&RE REPRESENTATIVE

DRILLER

DATE:

DAILY ACTIVITIES RECORD

PROJECT NAME: ______________________ PROJECT NUMBER: ____________

CLIENT: ______________________ LOCATION: ____________

DATE: ______________________ ARRIVAL TIME: ____________

B&RE PERSONNEL: ______________________ DEPARTURE TIME: ____________

CONTRACTOR: ______________________ DRILLER: ____________

ITEM	QUANTITY ESTIMATE	QUANTITY TODAY	PREVIOUS TOTAL QUANTITY	CUMULATIVE QUANTITY TO DATE

COMMENTS: ____

APPROVED BY:

______________________ ______________________

B&RE REPRESENTATIVE DRILLER

DATE: ____________

AS A MINIMUM, THE FOLLOWING ITEMS MUST BE INCLUDED IN THE FIELD LOGBOOK

- o All entries must be made in blue or black indelible ink.
- o Errors must be lined out ONCE and INITIALED.
- o Each page must be sequentially numbered, dated, signed and the project number must be written at the top of each page. No blank pages.
- o List the time of arrival at work site, and the names of all BRE personnel.
- o State the level of personal protection required (level D, level D mod. , level C, etc.)
- o Designation of the Field Team Leader and a Site Safety Officer.
- o State that a Site Safety Meeting/Briefing was conducted and who was present.
- o List weather conditions and update as necessary.
- o List specific reason(s) for site visit (sampling, drilling, etc...).
- o List Subcontractor(s) present at the site and time of arrivals to the site, list all heavy equipment (such as drilling rig, back hoe, jackhammer, etc....).
- o List name(s) and time(s) of arrival/departure of anyone visiting the site (such as BRE or subcontractor personnel, Client, regulators, inspectors.....)
- o Describe the method of decontamination for drilling tools, bailers, and other equipment. Site the reference(s) that you use for decontamination (i.e., In accordance with Section 5 of BRE's FDEP -approved CompQAP, etc...)
- o Indicate that the field instruments have been calibrated and indicate where the calibration information can be found if it is not listed in this logbook. Identify field instruments used by model number and I.D. number or serial number.
- o A physical description of all samples must be recorded. Give location of samples, boreholes, etc... A diagram or map would be most appropriate.
- o Describe the condition of the site prior to departure (such as wells locked, pump operational, diffused aerator down, barricades properly located, boreholes properly abandoned, etc.....)
- o Handling of drill cuttings, development/purge water, and other site derived wastes (e.g., drumming, spreading on plastic, etc.)
- o Reference all field forms that are used.

UNDER NO CIRCUMSTANCES SHOULD THE FIELD LOGBOOK BE IN ANYONE'S POSSESSION OTHER THAN BRE PERSONNEL.

Arnold C. Lamb
District Manager of Quality Assurance
February 2, 1995

EQUIPMENT CALIBRATION LOG

INSTRUMENT NAME/MODE____________________ PROJECT NAME : ____________________

MANUFACTURER : ____________________ PROJECT NUMBER : ____________________

ALIBRATION DATE	INITIAL SETTINGS	STANDARDS USED	PROCEDURE	ADJUSTMENTS MADE	FINAL SETTINGS	SIGNATURE	COMMENTS

BORING LOG

Page ___ of ___

PROJECT NAME: ____________________ BORING NUMBER: ____________________
PROJECT NUMBER: ____________________ DATE: ____________________
DRILLING COMPANY: ____________________ GEOLOGIST: ____________________
DRILLING RIG: ____________________ DRILLER: ____________________

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID (ppm): Sample	PID/FID (ppm): Sampler BZ	PID/FID (ppm): Borehole**	PID/FID (ppm): Driller BZ**

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): ______

Remarks: ____________________

Converted to Well: Yes ______ No ______ Well I.D. #: ____________________

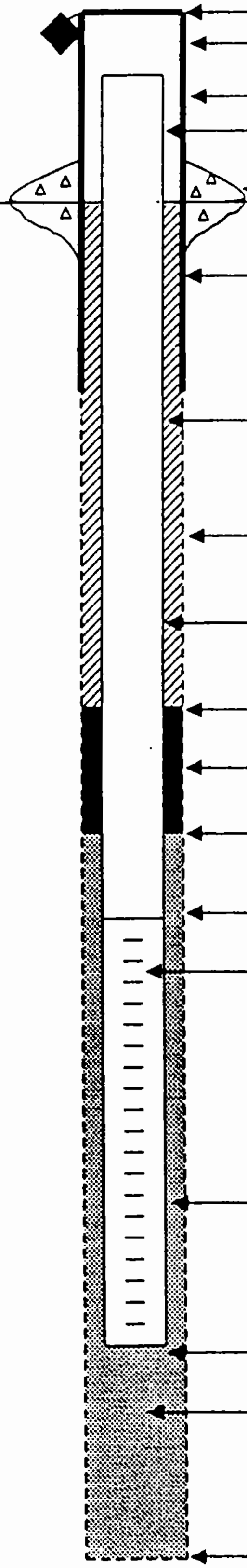
BORING NO.: ______

OVERBURDEN
MONITORING WELL SHEET

PROJECT ______ LOCATION ______
PROJECT NO. ______ BORING ______
ELEVATION ______ DATE ______
FIELD GEOLOGIST ______

DRILLER ______
DRILLING METHOD ______
DEVELOPMENT METHOD ______

GROUND ELEVATION



ELEVATION OF TOP OF SURFACE CASING : ______
ELEVATION OF TOP OF RISER PIPE: ______
STICK - UP TOP OF SURFACE CASING: ______
STICK - UP RISER PIPE : ______
TYPE OF SURFACE SEAL: ______
______
I.D. OF SURFACE CASING: ______
TYPE OF SURFACE CASING: ______
______
RISER PIPE I.D. ______
TYPE OF RISER PIPE: ______
______
BOREHOLE DIAMETER: ______
TYPE OF BACKFILL: ______
______
ELEVATION / DEPTH TOP OF SEAL: ______ / ______
TYPE OF SEAL: ______
______
DEPTH TOP OF SAND PACK: ______
ELEVATION / DEPTH TOP OF SCREEN: ______ / ______
TYPE OF SCREEN: ______
SLOT SIZE x LENGTH: ______
I.D. OF SCREEN: ______
TYPE OF SAND PACK: ______
______
ELEVATION / DEPTH BOTTOM OF SCREEN: ______ / ______
ELEVATION / DEPTH BOTTOM OF SAND PACK: ______ / ______
TYPE OF BACKFILL BELOW OBSERVATION WELL: ______
______
ELEVATION / DEPTH OF HOLE: ______ / ______

SOUTHNAVFAC

CONFINING LAYER MONITORING WELL SHEET

PROJECT ______________________ LOCATION ______________________

PROJECT NO. ______________________ BORING ______________________

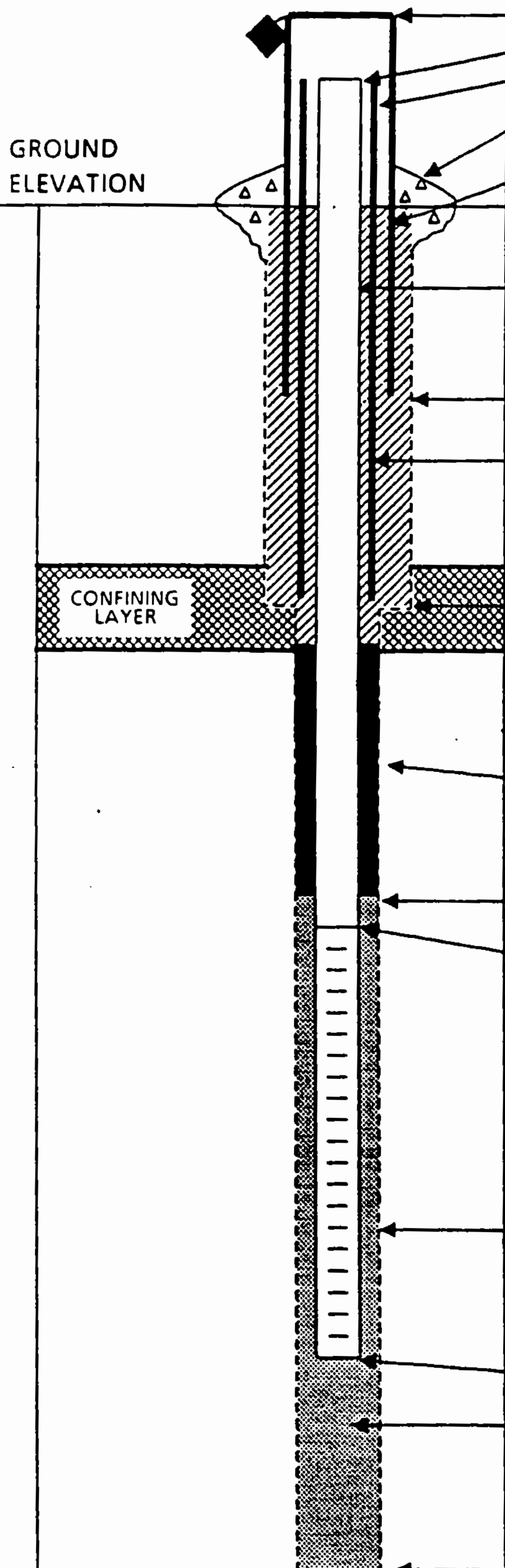
ELEVATION ______________________ DATE ______________________

FIELD GEOLOGIST ______________________

DRILLER ______________________

DRILLING METHOD ______________________

DEVELOPMENT METHOD ______________________



ELEVATION OF TOP OF SURFACE CASING : ______

ELEVATION OF TOP OF RISER PIPE: ______

ELEVATION TOP OF PERM. CASING: ______

TYPE OF SURFACE SEAL: ______________________

I.D. OF SURFACE CASING: ______________________

TYPE OF SURFACE CASING: ______________________

RISER PIPE I.D. ______________________

TYPE OF RISER PIPE: ______________________

BOREHOLE DIAMETER: ______________________

PERM. CASING I.D. ______________________

TYPE OF CASING & BACKFILL: ______________________

ELEVATION / DEPTH TOP CONFINING LAYER: ______ / ______

ELEVATION / DEPTH BOTTOM OF CASING: ______ / ______

ELEVATION / DEPTH BOT. CONFINING LAYER: ______ / ______

ELEVATION / DEPTH TOP OF SEAL: ______ / ______

TYPE OF SEAL: ______________________

DEPTH TOP OF SAND PACK: ______

ELEVATION/DEPTH TOP OF SCREEN: ______ / ______

TYPE OF SCREEN: ______________________

TYPE OF SAND PACK: ______________________

BOREHOLE DIA. BELOW CASING: ______________________

ELEVATION / DEPTH BOTTOM OF SCREEN: ______ / ______

ELEVATION / DEPTH BOTTOM OF SAND PACK: ______ / ______

TYPE OF BACKFILL BELOW OBSERVATION WELL: ______________________

ELEVATION / DEPTH OF HOLE: ______ / ______

SOUTHNAVFAC

LOG OF BORING

··OJECT NO:	PROJECT NAME:
·OJECT LOCATION:	DATE DRILLED:
DRILLING COMPANY:	SURFACE ELEVATION: *Feet*
DRILLING METHOD:	BORING DIAMETER: *Inches*
DRILLING RIG:	GEOLOGIST:

DEPTH feet	SAMPLE NUMBER	BLOWS/FT.	PID (ppm)				GRAPHIC LOG	USCS/ROD	GEOLOGIC DESCRIPTION Density/Consistency, Hardness, Color	WELL DIAGRAM
			Sample	B. Zone	Borehole	Drill B. Z.				
5										
10										
20										
25										
30										
35										

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: ______________________

Project No.: ______________________

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other: ______________________
[] QA Sample Type: ______________________

Sample ID No.: ______________________

Sample Location: ______________________

Sampled By: ______________________

C.O.C. No.: ______________________

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

MONITORING WELL DEVELOPMENT RECORD

Well: ____________________________
Site: ____________________________
Date Installed: ___________________
Date Developed: __________________
Dev. Method: _____________________
Pump Type: ______________________

Depth to Bottom (ft.): _______________
Static Water Level Before (ft.): _________
Static Water Level After (ft.): __________
Screen Length (ft.): _________________
Specific Capacity: ____________________
Casing ID (in.): _______________________

Responsible Personnel: ______________________________
Drilling Co.: _______________________________________
Project Name: ______________________________________
Project Number: ____________________________________

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)

GROUNDWATER LEVEL MEASUREMENT SHEET

Project: ______________________ Project No.: ______________

Location: ______________________ Personnel: ______________

Weather: ______________________ Measuring Device: ______________

Date: ______________________ Remarks: ______________

Well Number	Time	(A) Elevation of Reference Point (feet)*	(B) Water Level Indicator Reading (feet)*	=(A)-(B) Groundwater Elevation (feet)*	Total Well Depth (feet)*	Comments

Notes: ____

*All measurements to the nearest 0.01 foot

DEP Form # 62-770.900(3)
Form Title: Petroleum or Petroleum Products Water Sampling Log
Effective Date: September 23, 1997

Petroleum or Petroleum Products Water Sampling Log

FDEP FACILITY NO.:	WELL NO.:	SAMPLE ID:	DATE: / /
SITE NAME:		SITE LOCATION:	

PURGE DATA

WELL DIAMETER (in):	TOTAL WELL DEPTH (ft):	DEPTH TO WATER (ft):	WELL CAPACITY (gal/ft):

1 WELL VOLUME (gal) = (TOTAL WELL DEPTH - DEPTH TO WATER) x WELL CAPACITY =

= (-) x =

PURGE METHOD:	PURGING INITIATED AT:	PURGING ENDED AT:
	PURGE RATE (gpm):	TOTAL VOLUME PURGED (gal):

WELL VOLS. PURGED	CUMUL. VOLUME PURGED (gal)	pH	TEMP. (°C)	COND. (μmhos)	COLOR	ODOR	APPEARANCE	OTHER

SAMPLING DATA

SAMPLED BY / AFFILIATION	SAMPLER(S) SIGNATURE(S)	
SAMPLING METHOD(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
FIELD DECONTAMINATION: Y N	FIELD-FILTERED: Y N	DUPLICATE: Y N

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	

REMARKS:

MATERIAL CODES: AG = AMBER GLASS; CG = CLEAR GLASS; HDP = HIGH DENSITY POLYETHYLENE; O = OTHER (SPECIFY)

WELL CAPACITY: 1.25" = 0.06 gal/ft; 2" = 0.16 gal/ft; 4" = 0.65 gal/ft; 6" = 1.47 gal/ft; 8" = 2.61 gal/ft; 12" = 5.88 gal/ft

NOTE: this does not constitute all the information required by Chapter 62-160, F.A.C.

Chain of stody Record

Page of

DEP Form #: 62-770.900(2)
Form Title: Chain of Custody Record
Effective Date: September 23, 1997

Company:	
Address:	
Phone: Fax:	

FDEP Facility No.:
Project Name:
Sampling CompQAP No.:
Approval Date:

REQUESTED DUE DATE
/ /

Sampled by [Print Name(s)] / Affiliation

Sampler(s) Signature(s)

Preservatives (see codes)

Analyses Requested

Item No.	Field ID No.	Sampled Date	Sampled Time	Grab or Composite	Matrix (see codes)	Number of Containers										Remarks	Lab. No.

← Total Number of Containers

Shipment Method	
Out: / /	Via:
Returned: / /	Via:

Additional Comments:

Item No.	Relinquished by / Affiliation	Date	Time	Accepted by / Affiliation	Date	Time

Cooler No.(s) / Temperature(s) (°C)	Sampling Kit No.	Equipment ID No.

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) O = Other (specify)

PRESERVATIVE CODES: H = Hydrochloric acid + ice I = Ice only N = Nitric acid + ice S = Sulfuric acid + ice O = Other (specify)

BROWN & ROOT, INC.
P.O. BOX 3, HOUSTON, TEXAS 77001-0003
ATTN: VENDOR INFORMATION COORDINATION DEPARTMENT
BLDG. 01, ROOM 332

SUBCONTRACTOR EVALUATION FORM

IMPORTANT: Be sure to complete Performance section. If additional space is necessary for any item use Remarks section.

BROWN & ROOT JOB NUMBER	SUBCONTRACT NUMBER	DATE OF EVALUATION

NAME AND ADDRESS OF SUBCONTRACTOR	PROJECT DESCRIPTION AND LOCATION

NAMES OF PARTIES RESPONSIBLE FOR SUBCONTRACT ADMINISTRATION

CONSTRUCTION	ENGINEERING	PROCUREMENT

SUBCONTRACT DATA

SCOPE OF WORK	AMOUNT OF LIQUIDATED DAMAGES COLLECTED *(IF APPLICABLE)*
	$

COMPLEXITY	ORIGINAL PRICE	BACKCHARGES		CHANGE ORDERS		CLAIMS BY SUBCONTRACTOR (SUBMITTED/ACCEPTED)		TOTAL PRICE
		NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT	
☐ DIFFICULT ☐ SIMPLE ☐ ROUTINE	$		$		$	/	$ /$	$

DATE SUBCONTRACT AWARDED	NOTICE TO PROCEED DATE *(IF APPLICABLE)*
SCHEDULED SUBCONTRACT COMPLETION DATE *(INCLUDING EXTENSIONS)*	ACTUAL COMPLETION DATE OF SUBCONTRACT

EVALUATOR

NAME AND TITLE OF PERSON PERFORMING EVALUATION	NAME AND TITLE OF SUPERVISOR	
SIGNATURE	SIGNATURE	DATE

PERFORMANCE

CATEGORY	RATING*	COMMENTS
Vendor Drawings		
Quality of Work		
Safety/Housekeeping		
Schedule Compliance		
Commercial Conformance		

*RATING BASIS: 1 = UNSATISFACTORY 2 = BELOW AVERAGE 3 = AVERAGE 4 = GOOD 5 = EXCELLENT N/A = NOT APPLICABLE

REMARKS:

Order No. 36383 (07-89)

INSTRUCTIONS ON BACKSIDE OF FORM

INSTRUCTIONS

- Evaluations are required for all formal (other than "field") subcontracts.
- Evaluations should be prepared by the Subcontracts Administrator with input from Construction, Engineering, QA/QC, and Accounts Payable (as applicable).
- Commercial conformance is the rating category for change orders, claims, backcharges, invoicing, payment to lower tier subcontractors and suppliers, liens and related items.
- Completed forms should be sent to the Vendor Information Coordination Department when subcontracts are completed and closed out.

APPENDIX D

STANDARD OPERATING PROCEDURES

TABLE OF CONTENTS

1.0 PURPOSE

The purpose of this document is to specify a consistent sample nomenclature system that will facilitate subsequent data management in a cost-effective manner. The sample nomenclature system has been devised such that the following objectives can be attained:

- Sorting of data by matrix.
- Sorting of data by depth.
- Maintenance of consistency (field, laboratory, and data base sample numbers).
- Accommodation of all project-specific requirements on a global basis.
- Accommodation of laboratory sample number length constraints (10 characters).

2.0 SCOPE

The methods described in this procedure shall be used consistently for all projects requiring electronic data handling managed by personnel located in the Northeast Region of Brown & Root Environmental (Pittsburgh, Wayne, Holt, and Wilmington) and for any large contracts managed by the Northeast Region (e.g., NORTHDIV CLEAN, SOUTHDIV CLEAN, ARCS I, ARCS III, etc.). Smaller projects (as determined by Project Manager) are outside the scope of this SOP.

3.0 GLOSSARY

None.

4.0 RESPONSIBILITIES

Program Manager - It shall be the responsibility of the Program Manager (or designee) to inform contract-specific Project Managers of the existence and requirements of this Standard Operating Procedure.

Project Manager - It shall be the responsibility of the Project Manager to determine the applicability of this Standard Operating Procedure based on: (1) program-specific requirements, and (2) project size and objectives. It shall be the responsibility of the Project Manager (or designee) to ensure that the sample nomenclature is thoroughly specified in the relevant project planning document (e.g., sampling and analysis plan) and is consistent with this Standard Operating Procedure if relevant. It shall be the responsibility of the project manager to ensure that the Field Operations Leader is familiar with the sample nomenclature system.

Field Operations Leader - It shall be the responsibility of the Field Operations Leader to ensure that all field technicians or sampling personnel are thoroughly familiar with this Standard Operating Procedure and the project-specific sample nomenclature system. It shall be the responsibility of the Field Operations Leader to ensure that the sample nomenclature system is used during all project-specific sampling efforts.

5.0 PROCEDURES

5.1 Introduction

The sample numbering system consists of 12 distinct alpha-numeric characters, only 10 of which will be provided to the laboratory on the sample labels and chain-of-custody forms. The sample number provided to the lab shall be as follows where "A" indicates "alpha," "N" indicates "numeric," and "E" indicates "either"):

E E E A A E E E N N

Once the analytical results are received from the laboratory the sample number will be revised by a subroutine such that the sample number is more user friendly (i.e., dashes will be inserted). The sample number will then appear as follows:

E E E - A A - E E E - N N

If multiple sampling events occur (or are planned) for a given matrix, a subroutine within the database will be used to append two additional characters such that the sample number will appear as follows:

E E E	-	A A	-	E E E	-	N N	-	N N
Site		Type		Location		Depth		Round

5.2 Sample Number Field Requirements

The various fields in the sample number will include the following:

- Site Identifier
- Sample Type
- Sample Location
- Sample Depth Indicator
- Sampling Round

The site identifier must be a three-character field (numeric characters, alpha characters, or a mixture of alpha and numeric characters may be used). A site number is necessary since many facilities/sites have multiple individual sites, SWMUs, operable units, etc.

The sample type must be a two-character alpha field. Suggested codes are provided in Section 5.3 of this SOP.

The sample location must be a three-character field (alpha, numeric, or a mixture).

The depth field must be provided for all samples, regardless if it is strictly applicable (as discussed in Section 5.3).

The sampling round is optional, but, if provided, must be two numeric characters.

5.3 Example Sample Field Designations

Examples of each of the fields are as follows:

Site Number - Examples of site numbers/designations are as follows:

- A01 - Area of Concern Number 1
- 125 - Solid Waste Management Unit Number 125
- 000 - Base or Facility Wide Sample (e.g., upgradient well)
- BBG - Base Background

The examples cited are only suggestions. Each Project Manager (or designee) must designate appropriate (and consistent) site designations for their individual project.

Sample Type - Examples of sample types are as follows:

- AS - Air Sample
- BS - Biota Sample (See Note)
- CP - Composite Sample
- CS - Chip Sample
- DS - Drum Sample
- DU - Dust Sample
- FP - Free Product
- ID - Investigation Derived Waste Sample
- LT - Leachate Sample
- MW - Monitoring Well
- OF - Outfall Sample
- RW - Residential Well Sample
- SB - Soil Boring Sample
- SD - Sediment Sample
- SC - Scrape Sample
- SG - Soil Gas Sample
- SP - Seep Sample
- SS - Surface Soil Sample
- SU - Subsurface Soil Sample
- SW - Surface Water Sample
- TP - Test Pit Sample
- TW - Temporary Well Sample
- WC - Well Construction Material Sample
- WI - Wipe Sample
- WP - Well Point Sample
- WS - Waste/Sludge Sample

Note: The biota sample designation may be contingent upon the type of biota sampled (e.g., BL - Lobster; BF - Finfish; BC - Clam; BO - Oyster). Numerous other examples can be cited but will be site-specific.

This field will also be used to designate field Quality Control Samples, as follows:

TB - Trip Blank
FB - Field Blank
RB - Rinsate Blank (Equipment Blank)
BB - Bottle Blank
AB - Ambient Condition Blank

Field quality control samples should be numbered sequentially (e.g., RB-001; FB-010, etc.).

Filtered/unfiltered surface water or groundwater samples shall be handled in an separate manner, as subsequently discussed.

Location - Examples of the location field are as follows:

A01 - Grid node A1
001 - Monitoring Well 1

It is important that consistency be maintained with respect to the use of the characters "0" and O. Data base subroutines will not sort correctly if a mixture are used (e.g, AO1 and A02).

Depth - Formerly, depth specifications were indicated with a four digit field (e.g., 0002 - 0 to 2 feet). While this is effective for depth sorting, it is difficult to include this level of detail in a 10-character lab number (FormMaster limitations). In addition, this approach will not accommodate non-integer depths (e.g., 2.5 feet to 4.5 feet).

Based on such potential problems, the following approach shall be used: Sample depths will simply represent the horizon from which the sample was obtained: For example, if ten split-spoon samples are collected from a boring, they will be numbered 01 through 10. The sample log sheet will be used to record the specific depth of the sample, and this information will be entered in a separator field in the data base.

Similar nomenclature will be used for depth-specific surface water and sediment samples, etc. If no depth information is required (e.g., groundwater samples), the field must still be filled (e.g., Ø, Ø).

This field will also be used for the designation of filtered and unfiltered samples. An unfiltered groundwater sample shall be designated as U0, if and only if, a corresponding filtered sample is collected. Such as sample shall be designated as F0.

Sampling Round - The sampling round field is straightforward. It can range from 01 to 99.

5.4 **Example Sample Numbers**

Examples of complete sample numbers (field/data base versus laboratory) are as follows:

Field/Data Base ID	Lab ID	Description
101-SB-A01-01	101SBA0101	The first sample (e.g., 0 to 2 feet) from soil boring A01 (grid) at Site 101.
101-SB-A01-02	101SBA0102	The second sample from boring A01 (could be the next depth interval or a duplicate of 101-SB-A01-01).
125-MW-001-01-01	125MW00101	A groundwater sample from monitoring well MW001 (first sampling round)
125-MW-001-02-01	125MW00102	A duplicate groundwater sample from monitoring well MW001 (first sampling round)
130-MW-003-U1-01	130MW003U1	An unfiltered groundwater sample from monitoring well MW003 (first sampling round)
130-MW-003-F1-01	130MW003F1	A filtered groundwater sample from monitoring well MW003 (first sampling round)
137-RB-001-00-01	137RB00100	The first rinsate blank collected at site 137.
137-TB-004-00-02	137TB00400	The fourth trip blank collected during the second sampling event at Site 137.
155-SW-003-01-01	155SW00301	A surface water sample collected from the surface of a pond at Site 155.
155-SW-003-02-01	155SW00302	A surface water sample collected from the bottom of the water column in a pond at Site 155.

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		Effective Date 03/01/96	Revision 0
		Applicability B&R Environmental, NE	
		Prepared Earth Sciences Department	
Subject NON-RADIOLOGICAL SAMPLE HANDLING		Approved D. Senovich	

TABLE OF CONTENTS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide information on sample preservation, packaging, and shipping procedures to be used in handling environmental samples submitted for chemical constituent, biological, or geotechnical analysis. Sample chain-of-custody procedures and other aspects of field documentation are addressed in SOP SA-6.3. Sample identification is addressed in SOP CT-04.

2.0 SCOPE

This procedure:

- Describes the appropriate containers to be used for samples depending on the analyses to be performed, and the steps necessary to preserve the samples when shipped off site for chemical analysis.

- Provides instruction for sample packaging and shipping in accordance with current U.S. Department of Transportation (DOT) regulations.

3.0 GLOSSARY

Hazardous Material - A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. Under 49 CFR, the term includes hazardous substances, hazardous wastes, marine pollutants, and elevated temperature materials, as well as materials designated as hazardous under the provisions of §172.101 and §172.102 and materials that meet the defining criteria for hazard classes and divisions in Part 173.

Hazardous Waste - Any substance listed in 40 CFR, Subpart D (§261.30 et seq.), or otherwise characterized as ignitable, corrosive, reactive, or toxic (as defined by Toxicity Characteristic Leaching Procedure, TCLP, analysis) as specified under 40 CFR, Subpart C (§261.20 et seq.), that would be subject to manifest requirements specified in 40 CFR 262. Such substances are defined and regulated by EPA.

Marking - A descriptive name, identification number, instructions, cautions, weight, specification or UN marks, or combination thereof required on outer packaging of hazardous materials.

n.o.i - Not otherwise indicated (may be used interchangeably with n.o.s.).

n.o.s. - Not otherwise specified.

ORM - Other regulated material (see DOT 49 CFR 173.144).

Packaging - A receptacle and any other components or materials necessary for compliance with the minimum packaging requirements of 49 CFR 174, including containers (other than freight containers or overpacks), portable tanks, cargo tanks, tank cars, and multi-unit tank-car tanks to perform a containment function in conformance with the minimum packaging requirements of 49 CFR 173.24(a) & (b).

Placard - Color-coded, pictorial sign which depicts the hazard class symbol and name and which is placed on the side of a vehicle transporting certain hazardous materials.

Common Preservatives:

- Hydrochloric Acid - HCl
- Sulfuric Acid - H_2SO_4
- Nitric Acid - HNO_3
- Sodium Hydroxide - NaOH

Other Preservatives

- Zinc Acetate
- Sodium Thiosulfate - $Na_2S_2O_3$

Normality (N) - Concentration of a solution expressed as equivalent per liter, an equivalent being the amount of a substance containing 1 gram-atom of replaceable hydrogen or its equivalent. Thus, a one-molar solution of HCl, containing 1 gram-atom of H, is "one normal," whereas a one-molar solution of H_2SO_4, containing 2 gram-atoms of H, is "two normal."

Reportable Quantity (RQ) - For the purposes of this SOP, means the quantity specified in column 3 of the Appendix to DOT 49 CFR §172.101 for any material identified in column 1 of the appendix. A spill greater than the amount specified must be reported to the National Response Center.

Sample - A sample is physical evidence collected from a facility or the environment, which is representative of conditions at the location and time of collection.

4.0 RESPONSIBILITIES

Field Operations Leader - Directly responsible for the bottling, preservation, labeling, packaging, shipping, and custody of samples up to and including release to the shipper.

Field Samplers - Responsible for initiating the Chain-of-Custody Record (per SOP SA-6.3), implementing the packaging and shipping requirements, and maintaining custody of samples until they are relinquished to another custodian or to the common carrier.

5.0 PROCEDURES

Sample identification, labeling, documentation, and chain-of-custody are addressed by SOP SA-6.3.

5.1 Sample Containers

Different types of chemicals react differently with sample containers made of various materials. For example, trace metals adsorb more strongly to glass than to plastic, whereas many organic chemicals may dissolve various types of plastic containers. Attachments A and B show proper containers (as well as other information) per 40 CFR 136. In general, the sample container shall allow approximately 5-10 percent air space ("ullage") to allow for expansion/vaporization if the sample warms during transport. However, for collection of volatile organic compounds, head space shall be omitted. The analytical laboratory will generally provide certified-clean containers for samples to be analyzed for chemical constituents. Shelby tubes or other sample containers are generally provided by the driller for samples requiring geotechnical analysis. Sufficient lead time shall be allowed for a delivery of bottle orders. Therefore, it is critical to use the correct container to maintain the integrity of the sample prior to analysis.

Once opened, the container must be used at once for storage of a particular sample. Unused but opened containers are to be considered contaminated and must be discarded; because of the potential for introduction of contamination, they cannot be reclosed and saved for later use. Likewise, any unused containers which appear contaminated upon receipt, or which are found to have loose caps or a missing Teflon liner (if required for the container), shall be discarded.

5.2 Sample Preservation

Many water and soil samples are unstable and therefore require preservation to prevent changes in either the concentration or the physical condition of the constituent(s) requiring analysis. Although complete and irreversible preservation of samples is not possible, preservation does retard the chemical and biological changes that inevitably take place after the sample is collected. Preservation techniques are usually limited to pH control, chemical addition(s), and refrigeration/ freezing (certain biological samples only).

5.2.1 Overview

The preservation techniques to be used for various analytes are listed in Attachments A and B. Reagents required for sample preservation will either be added to the sample containers by the laboratory prior to their shipment to the field or be added in the field (in a clean environment). Only high purity reagents shall be used for preservation. In general, aqueous samples of low-concentration organics (or soil samples of low- or medium-concentration organics) are cooled to 4°C. Medium-concentration aqueous samples and high-hazard organics samples are typically not preserved. Low-concentration aqueous samples for metals are acidified with HNO_3, whereas medium-concentration and high-hazard aqueous metal samples are not preserved. Low- or medium-concentration soil samples for metals are cooled to 4°C, whereas high-hazard samples are not preserved.

The following subsections describe the procedures for preparing and adding chemical preservatives. Attachments A and B indicate the specific analytes which require these preservatives.

5.2.2 Preparation and Addition of Reagents

Addition of the following acids or bases may be specified for sample preservation; these reagents shall be analytical reagent (AR) grade or purer and shall be diluted to the required concentration with deionized water before field sampling commences. To avoid uncontrolled reactions, be sure to Add Acid to water (not vice versa). A dilutions guide is provided below.

Acid/Base	Dilution	Concentration	Estimated Amount Required for Preservation
Hydrochloric Acid (HCl)	1 part concentrated HCl: 1 part double-distilled, deionized water	6N	5-10 mL
Sulfuric Acid (H_2SO_4)	1 part concentrated H_2SO_4: 1 part double-distilled, deionized water	18N	2 - 5 mL
Nitric Acid (HNO_3)	Undiluted concentrated HNO_3	16N	2 - 5 mL
Sodium Hydroxide (NaOH)	400 grams solid NaOH dissolved in 870 mL double-distilled, deionized water; yields 1 liter of solution	10N	2 mL

The amounts required for preservation shown in the above table assumes proper preparation of the preservative and addition of the preservative to one liter of aqueous sample (assuming that the sample is initially at pH 7, is poorly buffered, and does not contain particulate matter; as these conditions vary, more preservative may be required). Consequently, the final sample pH must be checked using narrow-range pH paper, as described in the generalized procedure detailed below:

- Pour off 5-10 mL of sample into a dedicated, clean container. Use some of this sample to check the initial sample pH using wide range (0-14) pH paper. Never dip the pH paper into the sample; always apply a drop of sample to the pH paper using a clean stirring rod or pipette.

- Add about one-half of the estimated preservative required to the original sample bottle. Cap and invert gently several times to mix. Check pH (as described above) using medium range pH paper (pH 0-6 or pH 7.5-14, as applicable).

- Cap sample bottle and seal securely.

Additional considerations are discussed below:

- To test if ascorbic acid must be used to remove oxidizing agents present in the sample before it can be properly preserved, place a drop of sample on KI-starch paper. A blue color indicates the need for ascorbic acid addition.

  If required, add a few crystals of ascorbic acid to the sample and retest with the KI-starch paper. Repeat until a drop of sample produces no color on the KI-starch paper. Then add an additional 0.6 grams of ascorbic acid per each liter of sample volume.

  Continue with proper base preservation of the sample as described, generally, above.

- Samples for sulfide analysis must be treated by the addition of 4 drops (0.2 mL) of 2N zinc acetate solution per 100 ml of sample.

  The 2N zinc acetate solution is made by dissolving 220 grams of zinc acetate in 870 mL of double-distilled, deionized water to make 1 liter of solution.

  The sample pH is then raised to 9 using the NaOH preservative.

- To test of sodium thiosulfate must be added to remove residual chlorine from a sample, test the sample for residual chlorine using a field test kit especially made for this purpose.

  If residual chlorine is present, add 0.08 grams of sodium thiosulfate per liter of sample to remove the residual chlorine.

  Continue with proper acidification of the sample as described, generally, above.

For biological samples, 10% buffered formalin or isopropanol may also be required for preservation. Questions regarding preservation requirements should be resolved through communication with the laboratory <u>before</u> sampling begins.

5.3 Field Filtration

At times, field-filtration may be required to provide for the analysis of dissolved chemical constituents. Field-filtration must be performed prior to the preservation of samples as described above. General procedures for field filtration are described below:

- The sample shall be filtered through a non-metallic, 0.45-micron membrane filter, immediately after collection. The filtration system shall consist of dedicated filter canister, dedicated silicon tubing, and a peristaltic pump with pressure or vacuum pumping squeeze action (since the sample is filtered by mechanical peristalsis, the sample travels only through the tubing).

- To perform filtration, thread the silicon tubing through the peristaltic pump head. Attach the filter canister to the discharge end of the silicon tubing (note flow direction arrow); attach the aqueous sample container to the intake end of the silicon tubing. Turn the peristaltic pump on and perform filtration.

- Continue by preserving the filtrate (contained in the filter canister), as applicable and generally described above.

5.4 Sample Packaging and Shipping

Samples collected for shipment from a site shall be classified as either environmental or hazardous material samples. Samples from drums containing materials other than Investigative Derived Waste (IDW) and samples obtained from waste piles or bulk storage tanks are generally shipped as hazardous materials. A distinction must be made between the two types of samples in order to:

- Determine appropriate procedures for transportation of samples (if there is any doubt, a sample shall be considered hazardous and shipped accordingly.)

- Protect the health and safety of transport and laboratory personnel receiving the samples (special precautions are used by the shipper and at laboratories when hazardous materials are received.)

Detailed procedures for packaging environmental and hazardous material samples are outlined in the remainder of this section.

5.4.1 Environmental Samples

Environmental samples are packaged as follows:

- Place sample container, properly identified and with lid securely fastened in a plastic bag (e.g. Ziploc baggie), and seal the bag.

- Place sample in a cooler constructed of sturdy material which has been lined with a large, plastic (e.g. "garbage" bag).

- Pack with enough noncombustible, absorbent, cushioning materials such as vermiculite (shoulders of bottles must be iced if required) to minimize the possibility of the container breaking.

- If cooling is required (see Attachments A and B), double-bag ice in Ziploc baggies and place around container shoulders, and on top of absorbent packing material (minimum of 8 pounds of ice for a medium-size cooler).
- Seal (i.e., tape or tie top in knot) large liner bag.
- The original (top, signed copy) and extra carbonless copies of the COC form shall be placed inside a large Ziploc-type bag and taped inside the lid of the shipping cooler. If multiple coolers are sent but are included on one COC form, the COC form should be sent with the first cooler. The COC form should then state how many coolers are included with that shipment.
- Close and seal outside of cooler as described in SOP SA-6.3. Signed custody seals must be used.

Coolers must be marked as containing "Environmental Samples." The appropriate side of the container must be marked "This End Up" and arrows placed appropriately. No DOT marking or labeling is required; there are no DOT restrictions on mode of transportation.

5.4.2 Determination of Shipping Classification for Hazardous Material Samples

Samples not determined to be environmental samples, or samples known or expected to contain hazardous materials, must be considered hazardous material samples and transported according to the requirements listed below.

5.4.2.1 Known Substances

If the substance in the sample is known or can be identified, package, mark, label, and ship according to the specific instructions for that material (if it is listed) in the DOT Hazardous Materials Table, 49 CFR 172.101. (DOT Guide for shippers can be found in Attachment D of this document.)

To determine the proper shipping name, use the following steps to help locate the shipping name on the Hazardous Materials Table, DOT 49 CFR 172.101.

1. Look first for the chemical or technical name of the material, for example, ethyl alcohol. Note that many chemicals have more than one technical name, for example, perchloroethylene (not listed in 172.101) is listed as tetrachloroethylene (listed 172.101). It may be useful to consult a chemist for all possible technical names a material can have. If your material is not listed by its technical name, then . . .
2. Look for the chemical family name For example, pentyl alcohol is not listed but the chemical family name is: alcohol, n.o.s. (not otherwise specified). If the chemical family name is not listed, then . . .
3. Look for a generic name based on end use. For example, Paint, n.o.s or Fireworks, n.o.s. If a generic name based on end use is not listed, then . . .
4. Look for a generic family name based on end use, for example, drugs, n.o.s. or cosmetics, n.o.s. Finally, if your material is not listed by a generic family name but you suspect or know the material is hazardous because it meets the definition of one or more hazardous classes, then . . .

5. You will have to use the general hazard class for a proper shipping name. For example, Flammable Liquid, n.o.s, or Oxidizer, n.o.s.

5.4.2.2 Unknown Substances

For samples of hazardous substances of unknown content, select the appropriate transportation category according to the DOT hazardous materials classification of a material having more than one hazard. This procedure is outlined in DOT Regulation 49 CFR 173.2a. (This can be found in Attachment C of this SOP.)

The correct shipping classification for an unknown sample is selected through a process of elimination, as outlined in DOT Regulation 49 CFR 172.101(c)(11). By using the provisions in this paragraph, the proper shipping name and description will be determined. A step-by-step guide is provided by the Department of Transportation (DOT) and can be found in Attachment D of this SOP.

5.4.3 Packaging and Shipping of Samples Classified as Flammable Liquid (or Solid)

5.4.3.1 Packaging

Applying the word "flammable" to a sample does not imply that it is in fact flammable. The word prescribes the class of packaging according to DOT regulations.

1. Containerize sample as required (see Attachments A and B). To prevent leakage, fill container no more than 90 percent full. Seal lid with teflon tape or wire.

2. Complete sample label and attach securely to sample container.

3. Seal container and place in 2-mil-thick (or thicker) polyethylene bag (e.g., Ziploc baggie), one sample per bag. Position sample identification label so that it can be read through bag. Seal bag.

4. For soil jars, place sealed bag inside metal can (available from laboratory or laboratory supplier) and cushion it with enough noncombustible, absorbent material (for example, vermiculite or diatomaceous earth) between the bottom and sides of the can and bag to prevent breakage and absorb leakage. Pack one bag per can. Use clips, tape, or other positive means to hold can lid securely, tightly and permanently. Mark can as indicated in Paragraph 1 of Section 5.3.4.2, below. Single 1-gallon bottles do not need to be placed in metal cans.

5. Place one or more metal cans (or a single 1-gallon bottle) into a strong outside container, such as a metal picnic cooler or a DOT-approved fiberboard box. Surround cans (or bottle) with noncombustible, absorbent cushioning materials for stability during transport. The absorbent material should be able to absorb the entire contents of the container. Mark container as indicated in Paragraph 2 below.

5.4.3.2 Marking/Labeling

1. Use abbreviations only where specified. Place the following information, either hand-printed or in label form, on the metal can (or 1-gallon bottle):

   - Laboratory name and address.

- Proper shipping name from the hazardous materials table (DOT Regulation CFR 49 172.101). Example: "Flammable Liquid, n.o.s. UN1993" or "Flammable Solid, n.o.s. UN1325." This will include packing group (see Section 5.3.4.2, No. 2.)

Not otherwise specified (n.o.s) is not used if the flammable liquid (or solid) is identified. If identified, the name of the specific material is listed before the category (for example, Acetone, Flammable Liquid), followed by its appropriate UN number found in the DOT Hazardous Materials table (49 CFR 172.101).

2. Determine packing group. The packing group is part of the proper shipping name and must be included on the shipping papers in the description section.

   I. Most Hazardous
   II. Medium Hazard
   III. Least Hazardous

   The packing group will be listed in the hazardous materials table, column 5.

3. Place all information on outside shipping container as on can (or bottle), specifically:

   - Proper shipping name
   - UN or NA number
   - Proper label(s)
   - Addressee and sender

   Place the following labels on the outside shipping container: "Cargo Aircraft Only" and DOT label such as: "Flammable Liquid" (or "Flammable Solid"). "Dangerous When Wet" label shall be used if the Flammable Solid has not been exposed to a wet environment. "Laboratory Samples" and "THIS SIDE UP" or "THIS END UP" shall also be marked on the top of the outside container, and upward-pointing arrows shall be placed on all four sides of the container.

5.4.3.3 Shipping Papers

1. Use abbreviations only where specified. Complete the carrier-provided bill of lading and sign certification statement. Provide the following information in the order listed (one form may be used for more than one exterior container):

   - Proper shipping name. (Example: "Flammable Liquid, n.o.s. UN1993" or "Flammable Solid, n.o.s. UN1325 Packing Group I, II, III").

   - "Limited Quantity" (or "Ltd. Qty."). (See No. 3, below.)

   - "Cargo Aircraft Only."

   - Net weight (wt) or net volume (vol), just before or just after "Flammable Liquid, n.o.s." or "Flammable Solid, n.o.s.," by item, if more than one metal can is inside an exterior container.

   - "Laboratory Samples" (if applicable).

2. Include Chain-of-Custody Record, properly executed in outside container; use custody seals.

3. "Limited Quantity" means the maximum amount of a hazardous material for which there is a specific labeling or packaging exception (DOT CFR 49 171.8). This may mean that packages are exempted from labeling requirements. To determine if your sample meets the Limited Quantity Exception, refer to DOT Regulation CFR 49 Subpart C 173.50 through 173.156. First, determine the proper classification and shipping name for the material; then refer to the exception requirements for that particular class of material beginning with 173.50.

   Example: "Flammable Liquid n.o.s. UN1993 Packing Group 1." The outer package can weigh no more than 66 pounds gross weight. The inner package or container can weigh no more than 0.1 gallon net capacity for each container.

   To determine whether the material can be shipped as a "Limited Quantity," you must check the specific requirement for that class of material.

5.4.3.4 Transportation

1. The majority of unknown hazardous substance samples will be classified as flammable liquids. The samples will be transported by rented or common carrier truck, railroad, or express overnight package services. Do not transport samples on any passenger-carrying air transport system, even if the system has cargo-only aircraft. DOT regulations permit regular airline cargo-only aircraft, but difficulties with most suggest avoiding them. Instead, ship by airline carriers that carry only cargo. If unsure of what mode of transportation to use, consult the FOL or Project Manager.[1]

2. For transport by government-owned vehicle, including aircraft, DOT regulations do not apply. However, procedures described above, with the exception of execution of the bill of lading with certification, shall still be followed.

3. Use the hazardous materials shipping check list (Attachment E) as a guidance to ensure that all sample-handling requirements are satisfied.

4. In some cases, various materials may react if they break during shipment. To determine if you are shipping such materials, refer to the DOT compatibility chart in Attachment F.

5.5 Shipment of Lithium Batteries

Monitoring well data are analyzed using either the Hermit SE 1000 or the Hermit SE 2000 environmental data logger. These instruments are powered by lithium batteries. The Department of Transportation has determined that lithium batteries are a hazardous material and are to be shipped using the following information:

[1] Note: If you are unsure as how to ship the sample (hazardous or environmental sample), contact the FOL or Project Manager so that a decision can be made as to the proper shipping practices. The DOT penalties for improper shipment of a hazardous material are stringent and may include a prison term for intentional violations.

- Product Designation
  - Hermit SE 1000
  - Hermit SE 2000

- DOT Proper Shipping Name
  - Lithium batteries, contained in equipment, UN3091

- Classification or Division
  - Class 9

Shipment of equipment containing lithium batteries must be accompanied by shipping papers completed as indicated in Attachment G. The instrument will be shipped by Federal Express as a Hazardous Material. Place the instrument in the same container in which it was received. This container or case is a DOT-approved shipping container. For Federal Express procedures to ship hazardous materials, call 1-800-238-5355, extension 922-1666. In most cases, the return shipping papers and DOT labels will be shipped to you from the company warehouse or the vendor. An example of the types of labels used for shipment and the wording are shown in Attachment G. These labels will be attached to the outside container with the following wording:

- Lithium Batteries Contained in Equipment
  - UN-3091
  - Shipped Under CA-9206009

6.0 REFERENCES

American Public Health Association, 1981. Standard Methods for the Examination of Water and Wastewater, 15th Edition. APHA, Washington, D.C.

U.S. Department of Transportation, 1993. Hazardous Materials Regulations, 49 CFR 171-177.

U.S. EPA, 1984. "Guidelines Establishing Test Procedures for the Analysis of Pollutants under Clean Water Act." Federal Register, Volume 49 (209), October 26, 1984, p. 43234.

U.S. EPA, 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, U.S. EPA-EMSL, Cincinnati, Ohio.

ATTACHMENT A

GENERAL SAMPLE CONTAINER AND PRESERVATION REQUIREMENTS

Sample Type and Concentration		Container[1]	Sample Size	Preservation[2]	Holding Time[2]
WATER					
Organics (GC&GC/MS)	VOC Low	Borosilicate glass	2 x 40 mL	Cool to 4°C HCl to ≤ 2	14 days[8]
	Extractables (Low SVOCs and pesticide/PCBs)	Amber glass	2x2 L or 4x1 L	Cool to 4°C	7 days to extraction; 40 days after extraction
	Extractables (Medium SVOCs and pesticide/PCBs)	Amber glass	2x2 L or 4x1 L	None	7 days to extraction; 40 days after extraction
Inorganics	Metals Low	High-density polyethylene	1 L	HNO_3 to pH ≤2	6 months (Hg-28 days)
	Medium	Wide-mouth glass	16 oz.	None	6 months
	Cyanide Low	High-density polyethylene	1 L	NaOH to pH>12	14 days
	Cyanide Medium	Wide-mouth glass	16 oz.	None	14 days
Organic/ Inorganic	High Hazard	Wide-mouth glass	8 oz.	None	14 days
SOIL					
Organics (GC&GC/MS)	VOC	Wide-mouth glass with teflon liner	2 x 4 oz.	Cool to 4°C	14 days
	Extractables (Low SVOCs and pesticides/PCBs)	Wide-mouth glass	8 oz.	Cool to 4°C	14 days to extraction; 40 days after extraction
	Extractables (Medium SVOCs and pesticides/PCBs)	Wide-mouth glass	8 oz.	Cool to 4°C	14 days to extraction; 40 days after extraction
Inorganics	Low/Medium	Wide-mouth glass	8 oz.	Cool to 4°C	6 months (Hg - 28 days) Cyanide (14 days)
Organic/ Inorganic	High Hazard	Wide-mouth glass	8 oz.	None	NA
Dioxin/Furan	All	Wide-mouth glass	4 oz.	None	7 days until extraction; 40 days after extraction
TCLP	All	Wide-mouth glass	8 oz.	None	7 days until preparation; analysis as per fraction
AIR					
Volatile Organics	Low/Medium	Charcoal tube – 7 cm long, 6 mm OD, 4 mm ID	100 L air	Cool to 4°C	5 days recommended

[1] All glass containers should have Teflon cap liners or septa.
[2] See Attachment E. Preservation and maximum holding time allowances per 40 CFR 136.

ATTACHMENT B

ADDITIONAL REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES

Parameter Number/Name	Container(1)	Preservation(2)(3)	Maximum Holding Time(4)
INORGANIC TESTS:			
Acidity	P, G	Cool, 4°C	14 days
Alkalinity	P, G	Cool, 4°C	14 days
Ammonia - Nitrogen	P, G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Biochemical Oxygen Demand (BOD)	P, G	Cool, 4°C	48 hours
Bromide	P, G	None required	28 days
Chemical Oxygen Demand (COD)	P, G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Chloride	P, G	None required	28 days
Chlorine, Total Residual	P, G	None required	Analyze immediately
Color	P, G	Cool, 4°C	48 hours
Cyanide, Total and Amenable to Chlorination	P, G	Cool, 4°C; NaOH to pH 12; 0.6 g ascorbic acid(5)	14 days(6)
Fluoride	P	None required	28 days
Hardness	P, G	HNO_3 to pH 2; H_2SO_4 to pH 2	6 months
Total Kjeldahl and Organic Nitrogen	P, G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Nitrate - Nitrogen	P, G	None required	48 hours
Nitrate-Nitrite - Nitrogen	P, G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Nitrite - Nitrogen	P, G	Cool, 4°C	48 hours
Oil & Grease	G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Total Organic Carbon (TOC)	P, G	Cool, 4°C; HCl or H_2SO_4 to pH 2	28 days
Orthophosphate	P, G	Filter immediately; Cool, 4°C	48 hours
Oxygen, Dissolved-Probe	G Bottle & top	None required	Analyze immediately
Oxygen, Dissolved-Winkler	G Bottle & top	Fix on site and store in dark	8 hours
Phenols	G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Phosphorus, Total	P, G	Cool, 4°C; H_2SO_4 to pH 2	28 days
Residue, Total	P, G	Cool, 4°C	7 days
Residue, Filterable (TDS)	P, G	Cool, 4°C	7 days
Residue, Nonfilterable (TSS)	P, G	Cool, 4°C	7 days
Residue, Settleable	P, G	Cool, 4°C	48 hours
Residue, Volatile (Ash Content)	P, G	Cool, 4°C	7 days
Silica	P	Cool, 4°C	28 days
Specific Conductance	P, G	Cool, 4°C	28 days
Sulfate	P, G	Cool, 4°C	28 days

ATTACHMENT B
ADDITIONAL REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES
PAGE TWO

Parameter Number/Name	Container[1]	Preservation[2][3]	Maximum Holding Time[4]
INORGANIC TESTS (Cont'd):			
Sulfide	P, G	Cool, 4°C; add zinc acetate plus sodium hydroxide to pH 9	7 days
Sulfite	P, G	None required	Analyze immediately
Turbidity	P, G	Cool, 4°C	48 hours
METALS:[7]			
Chromium VI (Hexachrome)	P, G	Cool, 4°C	24 hours
Mercury (Hg)	P, G	HNO_3 to pH 2	28 days
Metals, except Chromium VI and Mercury	P, G	HNO_3 to pH 2	6 months
ORGANIC TESTS:[8]			
Purgeable Halocarbons	G, Teflon-lined septum	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]	14 days
Purgeable Aromatic Hydrocarbons	G, Teflon-lined septum	Cool, 4°C; 0.008% $Na_2S_2O_3$[5] HCl to pH 2[9]	14 days
Acrolein and Acrylonitrile	G, Teflon-lined septum	Cool, 4°C; 0.008% $Na_2S_2O_3$[5] adjust pH to 4-5[10]	14 days
Phenols[11]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]	7 days until extraction; 40 days after extraction
Benzidines[11, 12]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]	7 days until extraction[13]
Phthalate esters[11]	G, Teflon-lined cap	Cool, 4°C	7 days until extraction; 40 days after extraction
Nitrosamines[11, 14]	G, Teflon-lined cap	Cool, 4°C; store in dark; 0.008% $Na_2S_2O_3$[5]	7 days until extraction; 40 days after extraction
PCBs[11]	G, Teflon-lined cap	Cool, 4°C	7 days until extraction; 40 days after extraction
Nitroaromatics & Isophorone[11]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]; store in dark	7 days until extraction; 40 days after extraction
Polynuclear Aromatic Hydrocarbons (PAHs)[11,14]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]; store in dark	7 days until extraction; 40 days after extraction
Haloethers[11]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]	7 days until extraction; 40 days after extraction
Dioxin/Furan (TCDD/TCDF)[11]	G, Teflon-lined cap	Cool, 4°C; 0.008% $Na_2S_2O_3$[5]	7 days until extraction; 40 days after extraction

ATTACHMENT B
ADDITIONAL REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES
PAGE THREE

Parameter Number/Name	Container(1)	Preservation(2)(3)	Maximum Holding Time(4)
RADIOLOGICAL TESTS:			
1-5 Alpha, beta and radium	P, G	HNO_3 to pH 2	6 months

(1) Polyethylene (P): generally 500 ml or Glass (G): generally 1L.
(2) Sample preservation should be performed immediately upon sample collection. For composite chemical samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.
(3) When any sample is to be shipped by common carrier or sent through the United States Mail, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172).
(4) Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of samples under study are stable for the longer periods, and has received a variance from the Regional Administrator.
(5) Should only be used in the presence of residual chlorine.
(6) Maximum holding time is 24 hours when sulfide is present. Optionally, all samples may be tested with lead acetate paper before pH adjustments are made to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.
(7) Samples should be filtered immediately on site before adding preservative for dissolved metals.
(8) Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.
(9) Sample receiving no pH adjustment must be analyzed within 7 days of sampling.
(10) The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within 3 days of sampling.
(11) When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to 4°C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting the pH to 6-9; samples preserved in this manner may be held for 7 days before extraction and for 40 days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (re: the requirement for thiosulfate reduction of residual chlorine) and footnotes 12, 13 (re: the analysis of benzidine).
(12) If 1,2-diphenylthydrazine is likely to be present, adjust the pH of the sample to 4.0±0.2 to prevent rearrangement to benzidine.
(13) Extracts may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosphere.
(14) For the analysis of diphenylnitrosamine, add 0.008% $Na_2S_2O_3$ and adjust pH to 7-10 with NaOH within 24 hours of sampling.
(15) The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $Na_2S_2O_3$.

ATTACHMENT C

DOT HAZARDOUS MATERIAL CLASSIFICATION (49 CFR 173.2a)

1. Radioactive material (except a limited quantity)
2. Division 2.3, Poisonous Gases
3. Division 2.1, Flammable Gas
4. Division 2.2, Nonflammable gas
5. Division 6.1, Poisonous Liquids, Packing Group 1 (poison by inhalation only)
6. Division 4.2, Pyrophoric Material
7. Division 4.1, Self-Reactive Material
8. Class 3, Flammable Liquids*
9. Class 8, Corrosive Material
10. Division 4.1, Flammable Solid*
11. Division 4.2, Spontaneously Combustible Materials*
12. Division 4.3, Dangerous When Wet Materials*
13. Division 5.1, Oxidizers*
14. Division 6.1, Poisonous Liquids or Solids (other than Packing Group 1)*
15. Combustible liquid
16. Class 9, Miscellaneous Hazardous Materials

* If a material has or meets the criteria for more than one hazard class, use the precedence of hazardous table on the following page for Classes 3 and 8 and Divisions 4.1, 4.2, 4.3, 5.1, and 6.1. The following table ranks those materials that meet the definition of Classes 3 and 8 and Divisions 4.1, 4.2, 4.3, 5.1, and 6.1.

ATTACHMENT C (Continued)

PRECEDENCE OF HAZARD TABLE

(Hazard Class and Packing Group)

Class	Packing Group	4.2	4.3	5.1 I[a]	5.1 II[a]	5.1 III[a]	6.1 I (Dermal)	6.1 I (Oral)	6.1 II	6.1 III	8 I (Liquid)	8 I (Solid)	8 II (Liquid)	8 II (Solid)	8 III (Liquid)	8 III (Solid)
3	I						3	3	3	3	3	(c)	3	(c)	3	(c)
3	II						3	3	3	3	8	(c)	3	(c)	3	(c)
3	III						6.1	6.1	6.1	3[d]	8	(c)	8	(c)	3	(c)
4.1	II[b]	4.2	4.3	5.1	4.1	4.1	6.1	6.1	4.1	4.1	(c)	8	(c)	4.1	(c)	4.1
4.1	III[b]	4.2	4.3	5.1	4.1	4.1	6.1	6.1	6.1	4.1	(c)	8	(c)	8	(c)	4.1
4.2	II		4.3	5.1	4.2	4.2	6.1	6.1	4.2	4.2	(c)	8	(c)	4.2	(c)	4.2
4.2	III		4.3	5.1	4.2	4.2	6.1	6.1	6.1	4.2	(c)	8	(c)	8	(c)	4.2
4.3	I			5.1	4.3	4.3	6.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
4.3	II			5.1	4.3	4.3	6.1	4.3	4.3	4.3	8	8	8	4.3	4.3	4.3
4.3	III			5.1	4.3	4.3	6.1	6.1	6.1	4.3	8	8	8	8	4.3	4.3
5.1	I[a]						5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
5.1	II[a]						6.1	5.1	5.1	5.1	8	8	8	5.1	5.1	5.1
5.1	III[a]						6.1	6.1	6.1	5.1	8	8	8	8	5.1	5.1
6.1	I, Dermal										8	6.1	6.1	6.1	6.1	6.1
6.1	I, Oral										8	6.1	6.1	6.1	6.1	6.1
6.1	II, Inhalation										8	6.1	6.1	6.1	6.1	6.1
6.1	II, Dermal										8	6.1	8	6.1	6.1	6.1
6.1	II, Oral										8	8	8	6.1	6.1	6.1
6.1	III										8	8	8	8	8	8

(a) There are at present no established criteria for determining Packing Groups for liquids in Division 5.1. At present, the degree of hazard is to be assessed by analogy with listed substances, allocating the substances to Packing Group I, Great; Group II, Medium; or Group III, Minor Danger.

(b) Substances of Division 4.1 other than self-reactive substances.

(c) Denotes an impossible combination.

(d) For pesticides only, where a material has the hazards of Class 3, Packing Group III, and Division 6.1, Packing Group III, the primary hazard is Division 6.1, Packing Group III.

ATTACHMENT D

GUIDE FOR HAZARDOUS MATERIALS SHIPPERS

USE OF GUIDE - This guide is presented as an aid to shippers of hazardous materials. It does not contain or refer to all of the DOT requirements for shipping hazardous materials. For specific details, refer to all of the DOT requirements for shipping hazardous materials, as provided in the Code of Federal Regulations (CFR), Title 49, Transportation, Parts 100-199.

The following is offered as a step-by-step procedure to aid in compliance with the applicable DOT regulations.

STEP 1 - DETERMINE THE PROPER SHIPPING NAME. The shipper must determine the proper shipping name of the materials as listed in the Hazardous Materials Table, 49 CFR 172.101, Column (2).

STEP 2 - DETERMINE THE HAZARD CLASS OR CLASSES.

a. Refer to the Table, 49 CFR 172.101, Column (3), and locate the hazard class of the material.
b. If more than one class is shown for the proper shipping name, determine the proper class by definition.
c. If the materials have more than one hazard, classify the material based on the order of hazards in 49 CFR 173.2.

STEP 3 - SELECT THE PROPER IDENTIFICATION NUMBERS.

a. Refer to the Table, 49 CFR 172.101, Column (3a), and select the Identification Number (ID) that corresponds to the proper shipping name and hazard class.
b. Enter the ID number(s) on the shipping papers and display them, as required, on packagings, placards and/or orange panels.

STEP 4 - DETERMINE THE MODE(S) OF TRANSPORT TO ULTIMATE DESTINATION.

a. As a shipper, you must assure yourself that the shipment complies with various modal requirements.
b. The modal requirements may affect the following: (1) Packaging; (2) Quantity per Package; (3) Marking; (4) Labeling; (5) Shipping Papers; and (6) Certification.

STEP 5 - SELECT THE PROPER LABEL(S) AND APPLY AS REQUIRED.

a. Refer to the Table, 49 CFR 172.101, Column (4) for required labels.
b. For details on labeling refer to (1) Additional Labels, 49 CFR 172.402; (2) Placement of Labels, 49 CFR 172.406; (3) Packagings (Mixed or Consolidated), 49 CFR 172.404(a) and (h); (4) Packages Containing Samples, 49 CFR 172.402(h); (5) Radioactive Materials, 49 CFR 172.403; and (6) Authorized Label Modifications, 49 CFR 172.405.

STEP 6 - DETERMINE AND SELECT THE PROPER PACKAGES.

a. Refer to the Table, 49 CFR 172.101, Column (5a) for exceptions and Column (5b) for specification packagings. Consider the following when selecting an authorized package: Quantity per Package; Cushioning Material, if required; Proper Closure and Reinforcement; Proper Pressure; Outage; etc., as required.
b. If packaged by a prior shipper, make sure the packaging is correct and in proper condition for transportation.

ATTACHMENT D (Continued)
GUIDE FOR HAZARDOUS MATERIALS SHIPPERS

STEP 7 - MARK THE PACKAGING (INCLUDING OVERPACKS).

a. Apply the required markings (49 CFR 172.300); Proper shipping name and ID number, when required (49 CFR 172.301); Name and address of Consignee or Consignor (49 CFR 172.306).
b. For details and other required markings, see 49 CFR 172.300 through 172.338.

STEP 8 - PREPARE THE SHIPPING PAPERS.

a. The basic requirements for preparing shipping papers include Proper Shipping Name; Hazard Class; ID Number; Total Quantity; Shipper's Certification; and Emergency Response Telephone Number.
b. Make all entries on the shipping papers using the information required and in proper sequence (49 CFR 172.202).

STEP 9 - CERTIFICATION.

a. Each shipper must certify by printing (manually or mechanically) on the shipping papers that the materials being offered for shipment are properly classified, described, packaged, marked and labeled, and in proper condition for transportation according to the applicable DOT Regulations (49 CFR 172.202).

STEP 10 - LOADING, BLOCKING, AND BRACING. When hazardous materials are loaded into the transport vehicle or freight container, each package must be loaded, blocked, and braced in accordance with the requirements for mode of transport.

a. If the shipper loads the freight container or transport vehicle, the shipper is responsible for the proper loading, blocking, and bracing of the materials.
b. If the carrier does the loading, the carrier is responsible.

STEP 11 - DETERMINE THE PROPER PLACARD(S). Each person who offers hazardous materials for transportation must determine that the placarding requirements have been met.

a. For Highway, unless the vehicle is already correctly placarded, the shipper must provide the required placard(s) and required ID number(s) (49 CFR 172.506).
b. For Rail, if loaded by the shipper, the shipper must placard the rail car if placards are required (49 CFR 172.508).
c. For Air and Water shipments, the shipper has the responsibility to apply the proper placards.

STEP 12 - HAZARDOUS WASTE/HAZARDOUS SUBSTANCE.

a. If the material is classed as a hazardous waste or hazardous substance, most of the above steps will be applicable.
b. Pertinent Environmental Protection Agency regulations are found in the Code of Federal Regulations, Title 40, Part 262.

As a final check and before offering the shipment for transportation, visually inspect your shipment. The shipper should ensure that emergency response information is on the vehicle for transportation of hazardous materials.

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Revised March 1995.

ATTACHMENT E

HAZARDOUS MATERIALS SHIPPING CHECK LIST

PACKAGING

1. Check DOT 173.24 for appropriate type of package for hazardous substance.
2. Check for container integrity, especially the closure.
3. Check for sufficient absorbent material in package.
4. Check for sample tags and log sheets for each sample and for chain-of-custody record.

SHIPPING PAPERS

1. Check that entries contain only approved DOT abbreviations.
2. Check that entries are in English.
3. Check that hazardous material entries are specially marked to differentiate them from any nonhazardous materials being sent using same shipping paper.
4. Be careful that all hazardous classes are shown for multiclass materials.
5. Check total amounts by weight, quantity, or other measures used.
6. Check that any limited-quantity exemptions are so designated on the shipping paper.
7. Check that certification is signed by shipper.
8. Make certain driver signs for shipment.

RCRA MANIFEST

1. Check that approved state/federal manifests are prepared.
2. Check that transporter has the following: valid EPA identification number, valid driver's license, valid vehicle registration, insurance protection, and proper DOT labels for materials being shipped.
3. Check that destination address is correct.
4. Check that driver knows where shipment is going.
5. Check that the driver is aware of emergency procedures for spills and accidents.
6. Make certain driver signs for shipment.
7. Make certain one copy of executed manifest and shipping document is retained by shipper.

ATTACHMENT F

DOT SEGREGATION AND SEPARATION CHART

Class or Division	Notes	1.1-1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3 gas Zone A*	2.3 gas Zone B*	3	4.1	4.2	4.3	5.1	5.2	6.1 liquids PG-I Zone A*	7	8 liquids only
Explosives .... 1.1 and 1.2	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Explosives 1.3		*	*	*	*	*	X		X	X	X		X	X	X	X	X		X
Explosives 1.4		*	*	*	*	*	O		O	O	O		O				O		O
Very insensitive explosives 1.5	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Extremely insensitive explosives 1.6		*	*	*	*	*													
Flammable gases 2.1		X	X	O	X				X	O							O	O	
Non-toxic, non-flammable gases 2.2		X			X														
Poisonous gas - Zone A** 2.3		X	X	O	X		X				X	X	X	X	X	X			X
Poisonous gas - Zone B** 2.3		X	X	O	X		O				O	O	O	O	O	O			O
Flammable liquids 3		X	X	O	X				X	O					O		X		
Flammable solids 4.1		X			X				X	O							X		O
Spontaneously combustible materials 4.2		X	X	O	X				X	O							X		X
Dangerous-when-wet materials 4.3		X	X		X				X	O							X		O
Oxidizers 5.1	A	X	X		X				X	O	O						X		O
Organic peroxides 5.2		X	X		X				X	O							X		O
Poisonous liquids PG I - Zone A** .. 6.1		X	X	O	X		O				X	X	X	X	X	X			X
Radioactive materials 7		X			X		O												
Corrosive liquids 8		X	X	O	X				X	O		O	X	O	O	O	X		

No entry means that the materials are compatible (have no restrictions).

X These materials may not be loaded, transported, or stored together in the same vehicle or facility.
O The materials may not be loaded, transported, or stored together in the same vehicle or facility unless they are separated for 4 feet on all sides.
* Check the explosives compatibility chart in 49 CFR 179.848(f).
A Ammonium nitrate fertilizers may be stored with Division 1.1 materials.
** Denotes inhalation hazardous for poisons; consult field team leader or project manager if you encounter a material in this class before shipment.

ATTACHMENT G
LITHIUM BATTERY SHIPPING PAPERS

3224637861

Two completed and signed copies of this Declaration must be handed to the operator.

WARNING

Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.

TRANSPORT DETAILS

This shipment is within the limitations prescribed for: (delete non-applicable)	Airport of Departure
~~PASSENGER AND CARGO AIRCRAFT~~ / CARGO AIRCRAFT ONLY	
Airport of Destination: 19CYS	

Shipment type: *(delete non-applicable)* NON-RADIOACTIVE ~~RADIOACTIVE~~

NATURE AND QUANTITY OF DANGEROUS GOODS

Dangerous Goods Identification						
Proper Shipping Name	Class or Division	UN or ID No.	Subsidiary Risk	Quantity and type of packing	Packing Inst.	Authorization
LITHIUM BATTERIES CONTAINED IN EQUIPMENT	9	UN3091		1 PLASTIC BOX X 55 GRAMS	912 II	PER CA-9206009

Additional Handling Information

1 HERMIT SERIES DATALOGGER X 55 GRAMS (11 GRAMS/CELL)

I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in the proper condition for transport by air according to the applicable International and National Government Regulations.

Name/Title of Signatory

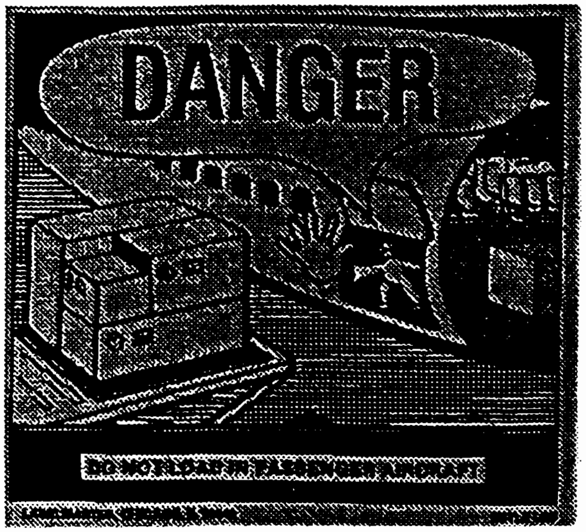
Place and Date

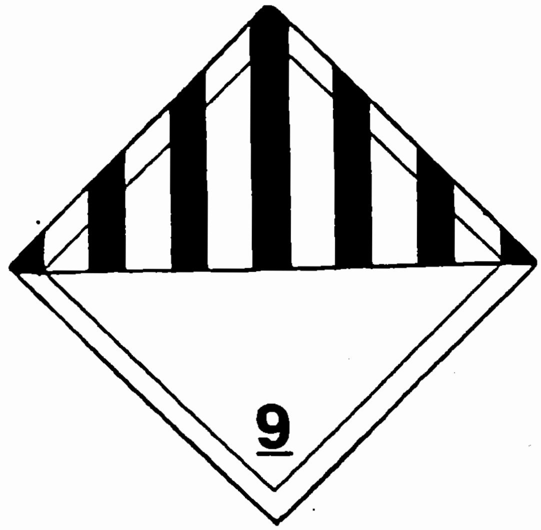
Signature (see warning above)

Emergency Telephone Number (Required for US Origin or Destination Shipments)
800-535-5053

IF ACCEPTABLE FOR PASSENGER AIRCRAFT, THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN, OR INCIDENT TO, RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT.

ATTACHMENT G (CONTINUED)
LITHIUM BATTERY SHIPPING PAPERS





LITHIUM BATTERIES CONTAINED IN EQUIPMENT.
UN-3091.
SHIPPED UNDER CA-9206009

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to identify and designate the field data record forms, logs and reports generally initiated and maintained for documenting Brown & Root Environmental field activities.

2.0 SCOPE

Documents presented within this procedure (or equivalents) shall be used for all Brown & Root Environmental field activities, as applicable. Other or additional documents may be required by specific client contracts.

3.0 GLOSSARY

None

4.0 RESPONSIBILITIES

Project Manager - The Project Manager is responsible for obtaining hardbound, controlled-distribution logbooks (from the appropriate source), as needed. In addition, the Project Manager is responsible for placing all forms used in site activities (i.e., records, field reports, and upon the completion of field work, the site logbook) in the project's central file.

Field Operations Leader (FOL) - The Field Operations Leader is responsible for ensuring that the site logbook, notebooks, and all appropriate forms and field reports illustrated in this guideline (and any additional forms required by the contract) are correctly used, accurately filled out, and completed in the required time-frame.

5.0 PROCEDURES

5.1 Site Logbook

5.1.1 General

The site logbook is a hard-bound, paginated controlled-distribution record book in which all major onsite activities are documented. At a minimum, the following activities/events shall be recorded (daily) in the site logbook:

- All field personnel present
- Arrival/departure of site visitors
- Arrival/departure of equipment
- Start or completion of borehole/trench/monitoring well installation or sampling activities
- Daily onsite activities performed each day
- Sample pickup information
- Health and Safety issues (level of protection observed, etc.)
- Weather conditions

A site logbook shall be maintained for each project. The site logbook shall be initiated at the start of the first onsite activity (e.g., site visit or initial reconnaissance survey). Entries are to be made for every day that onsite activities take place which involve Brown & Root Environmental or subcontractor personnel. Upon completion of the fieldwork, the site logbook must become part of the project's central file.

The following information must be recorded on the cover of each site logbook:

- Project name
- Brown & Root Environmental project number
- Sequential book number
- Start date
- End date

Information recorded daily in the site logbook need not be duplicated in other field notebooks (see Section 5.2), but must summarize the contents of these other notebooks and refer to specific page locations in these notebooks for detailed information (where applicable). An example of a typical site logbook entry is shown in Attachment A.

If measurements are made at any location, the measurements and equipment used must either be recorded in the site logbook or reference must be made to the site notebook in which the measurements are recorded (see Attachment A).

All logbook, notebook, and log sheet entries shall be made in indelible ink (black pen is preferred). No erasures are permitted. If an incorrect entry is made, the data shall be crossed out with a single strike mark, and initialed and dated. At the completion of entries by any individual, the logbook pages used must be signed and dated. The site logbook must also be signed by the Field Operations Leader at the end of each day.

5.1.2 Photographs

When movies, slides, or photographs are taken of a site or any monitoring location, they must be numbered sequentially to correspond to logbook entries. The name of the photographer, date, time, site location, site description, and weather conditions must be entered in the logbook as the photographs are taken. A series entry may be used for rapid-sequence photographs. The photographer is not required to record the aperture settings and shutter speeds for photographs taken within the normal automatic exposure range. However, special lenses, films, filters, and other image-enhancement techniques must be noted in the logbook. If possible, such techniques shall be avoided, since they can adversely affect the admissibility of photographs as evidence. Chain-of-custody procedures depend upon the subject matter, type of film, and the processing it requires. Film used for aerial photography, confidential information, or criminal investigation require chain-of-custody procedures. Adequate logbook notation and receipts must be compiled to account for routine film processing. Once processed, the slides of photographic prints shall be consecutively numbered and labeled according to the logbook descriptions. The site photographs and associated negatives must be docketed into the project's central file.

5.2 <u>Site Notebooks</u>

Key field team personnel may maintain a separate dedicated notebook to document the pertinent field activities conducted directly under their supervision. For example, on large projects with multiple investigative sites and varying operating conditions, the Health and Safety Officer may elect to maintain a separate site notebook. Where several drill rigs are in operation simultaneously, each site geologist assigned to oversee a rig must maintain a site notebook.

5.3 Sample Forms

A summary of the forms illustrated in this procedure is shown as the listing of Attachments in the Table of Contents for this SOP. Forms may be altered or revised for project-specific needs contingent upon client approval. Care must be taken to ensure that all essential information can be documented. Guidelines for completing these forms can be found in the related sampling SOP.

5.3.1 Sample Collection, Labeling, Shipment and Request for Analysis

5.3.1.1 Sample Log Sheet

Sample Log Sheets are used to record specified types of data while sampling. Attachments B-1 to B-4 are examples of Sample Log Sheets. The data recorded on these sheets are useful in describing the waste source and sample as well as pointing out any problems encountered during sampling. A log sheet must be completed for each sample obtained, including field quality control (QC) samples.

5.3.1.2 Sample Label

A typical sample label is illustrated in Attachment B-5. Adhesive labels must be completed and applied to every sample container. Sample labels can usually be obtained from the appropriate Program source or are supplied from the laboratory subcontractor.

5.3.1.3 Chain-of-Custody Record Form

The Chain-of-Custody (COC) Record is a multi-part form that is initiated as samples are acquired and accompanies a sample (or group of samples) as they are transferred from person to person. This form must be used for any samples collected for chemical or geotechnical analysis whether the analyses are performed on site or off site. One part of the completed COC form is retained by the field crew while the other two or three portions are sent to the laboratory. The original (top, signed copy) and extra carbonless copies of the COC form shall be placed inside a large Ziploc-type bag and taped inside the lid of the shipping cooler. If multiple coolers are sent but are included on one COC form, the COC form should be sent with the first cooler. The COC form should then state how many coolers are included with that shipment. An example of a Chain-of-Custody Record form is provided as Attachment B-6. A supply of these forms are purchased and stocked by the field department of the various Brown & Root Environmental offices. Alternately, COC forms supplied by the laboratory may be used. Once the samples are received at the laboratory, the sample cooler and contents are checked and any problems are noted on the enclosed COC form (any discrepancies between the sample labels and COC form and any other problems that are noted are resolved through communication between the laboratory point-of-contact and the Brown & Root Environmental Project Manager). The COC form is signed and one of the remaining two parts are retained by the laboratory while the last part becomes part of the samples' corresponding analytical data package. Internal laboratory chain-of-custody procedures are documented in the Laboratory Quality Assurance Plan (LQAP).

5.3.1.4 Chain-of-Custody Seal

Attachment B-7 is an example of a custody seal. The Custody seal is also an adhesive-backed label. It is part of a chain-of-custody process and is used to prevent tampering with samples after they have been collected in the field and sealed in coolers for transit to the laboratory. The COC seals are signed and dated by the samplers and affixed across the opening edges of each cooler containing environmental samples. COC seals may be available from the laboratory; these seals may also be purchased from a supplier.

5.3.2 Geohydrological and Geotechnical Forms

5.3.2.1 Groundwater Level Measurement Sheet

A groundwater level measurement sheet, shown in Attachment C-1 must be filled out for each round of water level measurements made at a site.

5.3.2.2 Data Sheet for Pumping Test

During the performance of a pumping test (or an in-situ hydraulic conductivity test), a large amount of data must be recorded, often within a short time period. The pumping test data sheet (Attachment C-2) facilitates this task by standardizing the data collection format, and allowing the time interval for collection to be laid out in advance.

5.3.2.3 Packer Test Report Form

A packer test report form shown in Attachment C-3 must be completed for each well upon which a packer test is conducted following well installation.

5.3.2.4 Summary Log of Boring

During the progress of each boring, a log of the materials encountered, operation and driving of casing, and location of samples must be kept. The Summary Log of Boring (Attachment C-4) is used for this purpose and must be completed for each soil boring performed. In addition, if volatile organics are monitored on cores, samples or cuttings from the borehole (using HNU or OVA detectors), these results must be entered on the boring log (under the "Remarks" column) at the appropriate depth. The "Remarks" column can also be used to subsequently enter the laboratory sample number and the concentration of a few key analytical results. This feature allows direct comparison of contaminant concentrations with soil characteristics.

5.3.2.5 Monitoring Well Construction Details Form

A Monitoring Well Construction Details Form must be completed for every monitoring well piezometer or temporary well point installed. This form contains specific information on length and type of well riser pipe and screen, backfill, filter pack, annular seal and grout characteristics, and surface seal characteristics. This information is important in evaluating the performance of the monitoring well, particularly in areas where water levels show temporal variation, or where there are multiple (immiscible) phases of contaminants. Depending on the type of monitoring well (in overburden or bedrock), different forms are used (see Attachments C-5 through C-9). Similar forms are used for flush-mount well completions. The Monitoring Well Construction Details Form is not a controlled document.

5.3.2.6 Test Pit Log

When a test pit or trench is constructed for investigative or sampling purposes, a Test Pit Log (Attachment C-10) must be filled out by the responsible field geologist or sampling technician.

5.3.3 Equipment Calibration and Maintenance Form

The calibration or standardization of monitoring, measuring or test equipment is necessary to assure the proper operation and response of the equipment, to document the accuracy, precision or sensitivity of the measurement, and determine if correction should be applied to the readings. Some items of equipment require frequent calibration, others infrequent. Some are calibrated by the manufacturer, others by the user.

Each instrument requiring calibration has its own Equipment Calibration Log (Attachment D) which documents that the manufacturer's instructions were followed for calibration of the equipment, including frequency and type of standard or calibration device. An Equipment Calibration Log must be maintained for each electronic measuring device used in the field; entries must be made for each day the equipment is used.

5.4 Field Reports

The primary means of recording onsite activities is the site logbook. Other field notebooks may also be maintained. These logbooks and notebooks (and supporting forms) contain detailed information required for data interpretation or documentation, but are not easily useful for tracking and reporting of progress. Furthermore, the field logbook/notebooks remain onsite for extended periods of time and are thus not accessible for timely review by project management.

5.4.1 Weekly Status Reports

To facilitate timely review by project management, Xeroxed copies of logbook/notebook entries may be made for internal use. To provide timely oversight of onsite contractors, Daily Activities Reports are completed and submitted as described below.

It should be noted that in addition to the summaries described herein, other summary reports may also be contractually required.

5.4.2 Daily Activities Report

5.4.2.1 Description

The Daily Activities Report (DAR) documents the activities and progress for each day's field work. This report must be filled out on a daily basis whenever there are drilling, test pitting, well construction, or other related activities occurring which involve subcontractor personnel. These sheets summarize the work performed and form the basis of payment to subcontractors (Attachment E is an example of a Daily Activities Report).

5.4.2.2 Responsibilities

It is the responsibility of the rig geologist to complete the DAR and obtain the driller's signature acknowledging that the times and quantities of material entered are correct.

5.4.2.3 Submittal and Approval

At the end of the shift, the rig geologist must submit the Daily Activities Report to the Field Operations Leader (FOL) for review and filing. The Daily Activities Report is not a formal report and thus requires no further approval. The DAR reports are retained by the FOL for use in preparing the site logbook and in preparing weekly status reports for submission to the Project Manager.

6.0 ATTACHMENTS

Attachment A	TYPICAL SITE LOGBOOK ENTRY
Attachment B-1	EXAMPLE GROUNDWATER SAMPLE LOG SHEET
Attachment B-2	EXAMPLE SURFACE WATER SAMPLE LOG SHEET
Attachment B-3	EXAMPLE SOIL/SEDIMENT SAMPLE LOG SHEET
Attachment B-4	CONTAINER SAMPLE LOG SHEET FORM
Attachment B-5	SAMPLE LABEL
Attachment B-6	CHAIN-OF-CUSTODY RECORD FORM
Attachment B-7	CHAIN-OF-CUSTODY SEAL
Attachment C-1	EXAMPLE GROUNDWATER LEVEL MEASUREMENT SHEET
Attachment C-2	EXAMPLE PUMPING TEST DATA SHEET
Attachment C-3	PACKER TEST REPORT FORM
Attachment C-4	EXAMPLE BORING LOG
Attachment C-5	EXAMPLE OVERBURDEN MONITORING WELL SHEET
Attachment C-5A	EXAMPLE OVERBURDEN MONITORING WELL SHEET (FLUSHMOUNT)
Attachment C-6	EXAMPLE CONFINING LAYER MONITORING WELL SHEET
Attachment C-7	EXAMPLE BEDROCK MONITORING WELL SHEET - OPEN HOLE WELL
Attachment C-8	EXAMPLE BEDROCK MONITORING WELL SHEET - WELL INSTALLED IN BEDROCK
Attachment C-8A	EXAMPLE BEDROCK MONITORING WELL SHEET - WELL INSTALLED IN BEDROCK (FLUSHMOUNT)
Attachment C-9	EXAMPLE TEST PIT LOG
Attachment D	EXAMPLE EQUIPMENT CALIBRATION LOG
Attachment E	EXAMPLE DAILY ACTIVITIES RECORD
Attachment F	FIELD TRIP SUMMARY REPORT

ATTACHMENT A
TYPICAL SITE LOGBOOK ENTRY

START TIME: ______________________ DATE: ______________________

SITE LEADER: ______________________
PERSONNEL:

BROWN & ROOT ENV.	DRILLER	EPA
____________	____________	____________
____________	____________	____________
____________	____________	____________

WEATHER: Clear, 68°F, 2-5 mph wind from SE

ACTIVITIES:

1. Steam jenney and fire hoses were set up.
2. Drilling activities at well ____ resumes. Rig geologist was ____________. See Geologist's Notebook, No. 1, page 29-30, for details of drilling activity. Sample No. 123-21-S4 collected; see sample logbook, page 42. Drilling activities completed at 11:50 and a 4-inch stainless steel well installed. See Geologist's Notebook, No. 1, page 31, and well construction details for well _____.
3. Drilling rig No. 2 steam-cleaned at decontamination pit. Then set up at location of well ______.
4. Well _____ drilled. Rig geologist was __________________. See Geologist's Notebook, No. 2, page ____ for details of drilling activities. Sample numbers 123-22-S1, 123-22-S2, and 123-22-S3 collected; see sample logbook, pages 43, 44, and 45.
5. Well _____ was developed. Seven 55-gallon drums were filled in the flushing stage. The well was then pumped using the pitcher pump for 1 hour. At the end of the hour, water pumped from well was "sand free."
6. EPA remedial project manger arrives on site at 14:25 hours.
7. Large dump truck arrives at 14:45 and is steam-cleaned. Backhoe and dump truck set up over test pit ________.
8. Test pit ______ dug with cuttings placed in dump truck. Rig geologist was ____________. See Geologist's Notebook, No. 1, page 32, for details of test pit activities. Test pit subsequently filled. No samples taken for chemical analysis. Due to shallow groundwater table, filling in of test pit ___ resulted in a very soft and wet area. A mound was developed and the area roped off.
9. Express carrier picked up samples (see Sample Logbook, pages 42 through 45) at 17:50 hours. Site activities terminated at 18:22 hours. All personnel off site, gate locked.

____

Field Operations Leader

ATTACHMENT B-1
EXAMPLE GROUNDWATER SAMPLE LOG SHEET

GROUNDWATER

SAMPLE LOG SHEET

Page ____ of ____

Project Site Name: ____________________ Sample ID No.: ____________________

Project No.: ____________________ Sample Location: ____________________

- ☐ Domestic Well Data
- ☐ Monitoring Well Data
- ☐ Other Well Type: ____________________
- ☐ QA Sample Type: ____________________

Sampled By: ____________________

C.O.C. No.: ____________________

Sampling Data

Date: / Time: / Method:	pH	S.C.	Temp. (°C)	Turbidity	Color	TBD	TBD	TBD

Purge Data

	Volume	pH	S.C.	Temp. (°C)	Turbidity	Color	TBD	TBD
Date: / Method:	Initial							
Monitor Reading (ppm):	1							
Well Casing Dia. & Material Type:	2							
	3							
Total Well Depth (TD):	4							
Static Water Level (WL):	5							
TD-WL (ft.) =								
One Casing Volume: (gal/L)								
Start Purge (hrs.):								
End Purge (hrs.):								
Total Purge Time (min):								
Total Amount Purged (gal/L):								

Analysis	Preservative	Container Requirements	Collected (✓)

Observations/Notes:

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No:	

TBD: To Be Determined

ATTACHMENT B-2
EXAMPLE SURFACE WATER SAMPLING LOG SHEET

SURFACE WATER SAMPLING LOG SHEET

Page ____ of ____

Project Site Name: ____________________ Sample ID No.: ____________________

Project No.: ____________________ Sample Location: ____________________

- ☐ Spring
- ☐ Stream
- ☐ Other ____________________
- ☐ QA Sample Type: ____________________
- ☐ Pond
- ☐ Lake

Sampled By: ____________________

C.O.C. No.: ____________________

Sample Data		
Date and Time	Method	Depth

pH	S.C.	Temp. (°C)	Turbidity	Color	TBD	TBD	TBD

Analysis	Preservative	Container Requirements	Collected (✓)

Observations/Notes:

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	

TBD: To Be Determined

ATTACHMENT B-3
EXAMPLE SOIL/SEDIMENT SINGLE SAMPLE LOG SHEET

SOIL/SEDIMENT
SINGLE SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: ______________ Sample ID No.: ______________

Project No.: ______________ Sample Location: ______________

☐ Surface Soil
☐ Subsurface Soil
☐ Sediment
☐ Other ________
☐ QA Sample Type: ________

Sampled By: ______________

C.O.C. No.: ______________

Sample Method:

Depth Sampled:

Sample Date and Time:

Type of Sample
☐ Grab
☐ Composite
☐ Grab-Composite
☐ High Concentration
☐ Low Concentration

Composite Sample Data

Sample	Time	Color/Description

Grab Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)

Analysis	Container Requirements	Collected (✓)

Map:

Observations/Notes:

Circle if Applicable:

MS/MSD	Duplicate ID No:

Signature(s):

ATTACHMENT B-4
CONTAINER SAMPLE LOG SHEET FORM

Brown & Root Environmental

Page ___ of _

☐ Container Data

Case #: ______

By: ______________________

Project Site Name: ______________________ Project Site No. ______________________

Brown & Root Env. Source No. ______________ Source Location: ______________________

Container Source	Container Description
☐ Drum ☐ Bung Top ☐ Lever Lock ☐ Bolted Ring ☐ Other ______ ☐ Bag/Sack ☐ Tank ☐ Other ______	Color: ______ Condition: ______ Markings: ______ Vol. of Contents: ______ Other: ______

Disposition of Sample	Sample Description			
☐ Container Sampled		Layer 1	Layer 2	Layer 3
☐ Container opened but not sampled. Reason: ______	Phase	☐Sol. ☐Liq.	☐Sol. ☐Liq.	☐Sol. ☐Liq.
	Color	______	______	______
	Viscosity	☐L ☐M ☐H	☐L ☐M ☐H	☐L ☐M ☐H
☐ Container not opened. Reason: ______	% of Total Volume	______	______	______
	Other ______	______	______	______

Monitor Reading:	Type of Sample
Sample Method:	☐ Low Concentration ☐ High Concentration ☐ Grab ☐ Composite ☐ Grab-composite

	Sample Identification	Organic	Inorganic
Sample Date & Time:			
Sampled by:			
Signature(s):			
	Date Shipped		
Analysis:	Time Shipped		
	Lab		
	Volume		

ATTACHMENT B-5

SAMPLE LABEL

Brown & Root Environmental PROJECT: ____________________

STATION LOCATION: ____________________

DATE: ___/___/___ TIME: ________ hrs.

MEDIA: WATER ☐ SOIL ☐ SEDIMENT ☐ ________ ☐

CONCENTRATION: LOW ☐ MEDIUM ☐ HIGH ☐

TYPE: GRAB ☐ COMPOSITE ☐

ANALYSIS	PRESERVATION
VOA ☐ BNAs ☐	Cool to 4°C ☐
PCBs ☐ PESTICIDES ☐	HNO_3 to pH < 2 ☐
METALS: TOTAL ☐ DISSOLVED ☐	NaOH to pH > 12 ☐
CYANIDE ☐	________ ☐
________ ☐	

Sampled by: ____________________

Remarks:

ATTACHMENT B-6

CHAIN-OF-CUSTODY RECORD FORM
(Original is 8.5 x 11")

PROJECT NO.	PROJECT NAME			NO. OF CONTAINERS		REMARKS
SAMPLERS: (Signature)						
STA NO.	DATE	TIME	STATION LOCATION			

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks:	

ATTACHMENT B-7

CHAIN-OF-CUSTODY SEAL

Signature	**CUSTODY SEAL**
Date	Date
CUSTODY SEAL	Signature

ATTACHMENT C-1
EXAMPLE GROUNDWATER LEVEL MEASUREMENT SHEET

GROUNDWATER LEVEL MEASUREMENT SHEET

Page ___ of ___

PROJECT NAME: ____________________ LOCATION: ____________________
PROJECT NUMBER: ____________________ MEASURING DEVICE: ____________________
PERSONNEL: ____________________ ADJUSTMENT FACTOR: ____________________
DATE: ____________________ REMARKS: ____________________
WEATHER CONDITIONS: ____________________

Well or Piezometer Number	Time	Elevation of Reference Point (Feet)*	Water Level Indicator Reading (Feet)*	Groundwater Elevation (Feet)*	Comments

*Measurements to nearest 0.01 foot.

Signature(s): ____________________

ATTACHMENT C-2
EXAMPLE PUMPING TEST DATA SHEET

PUMPING TEST DATA SHEET

Page ___ of ___

PROJECT NAME: ____________________
PROJECT NUMBER: ____________________
PUMPING TEST: [ ]
TEST NUMBER: ____________________
METHOD OF MEASUREMENT: ____________________
DATE(s): ____________________
STATIC H_2O LEVEL (ft) (SO) ____________________

PUMPING WELL NUMBER: ____________________
MEASURED WELL NUMBER: ____________________
STEP DRAW DOWN TEST [ ]
MONITORING POINT: ____________________
DEPTH CORRECTION (ft) ____________________
PUMP SETTING (Ft. below monitoring point): ________
DISTANCE FROM PUMPING WELL (ft) (r): ________

PUMPING TEST PERFORMED BY: ____________________
REMARKS: ____________________

MILITARY TIME	ELAPSED TIME SINCE PUMP START OR STOP (Min.)	WATER LEVEL (Ft.)	CORRECTION (Ft.)	DRAW DOWN OR RECOVERY (Ft.)	FLOW METER READING (Gals.)	PUMPING RATE (GPM)	REMARKS

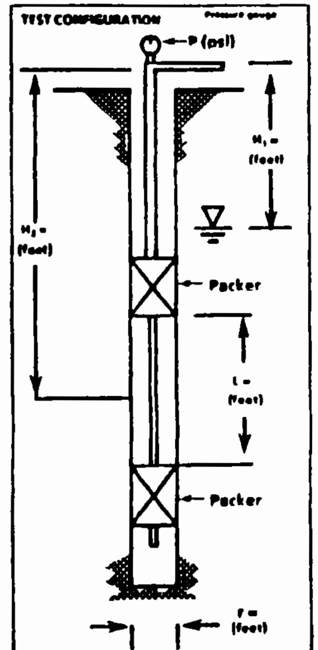
SIGNATURE(s): ____________________

ATTACHMENT C-3

PACKER TEST REPORT FORM

PROJECT: ______________________ PROJECT NO.: __________ TEST NO: __________ PAGE ____ OF ____
BORING NO.: __________ CASING DEPTH: __________ CONTRACTOR: ______________ STATIC WATER LEVEL __________
TEST INTERVAL: __________ BY: ______________ CHECKED: ______________ PACKER PRESSURE __________

Flow Test					Calculated Results								
Pressure, p (psi)	Elapsed Time (min)	Flow Reading	Δ Flow, ΔQ (ft³)	Δ Flow, ΔQ (gal)	Flow Rate Q (gal/min)	H_1* (ft)	Hp(Ft) = 2.31 (psi)	H_2* (ft)	H = Hp + (H1 or H2)	Cp	K (ft/yr) = Cp·Q/H	K (cm/sec) = 9.67 x 10⁻⁷ · K (ft/yr)



Length of Test Section in feet, L	Cp			
	Drilling bit size			
	[illegible] (1 5")	[illegible] (1 875")	[illegible] (2.37")	[illegible] (3")
1	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]

CP = (1/(2 π L)) ln(L/r) (70,315 S)
7.48 Gallons = 1 Ft³
1 psi = 2.31 ft head

* H_1 is used when the test length is below the water table.
H_2 is used when the test length is above the water table.

Remarks: ____

ATTACHMENT C-4
EXAMPLE BORING LOG

BORING LOG

Page___ of___

PROJECT NAME: ______________________ BORING NUMBER: ______________________
PROJECT NUMBER: ______________________ DATE: ______________________
DRILLING COMPANY: ______________________ GEOLOGIST: ______________________
WATER LEVEL DATA: ______________________

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows/ 6" or RQD (%)	Sample Recovery/ Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	* U S C S	Remarks	PID or FID Reading (ppm)

*When rock coring enter rock brokeness.

CONVERTED TO WELL: ___ Yes ___ No; WELL I.D.#: ______________________
REMARKS: ______________________

Signature(s): ______________________

LEGEND

SOIL TERMS

UNIFIED SOIL CLASSIFICATION (USCS)

COARSE-GRAINED SOILS
More Than Half of Material is LARGER Than No. 200 Sieve Size

FIELD IDENTIFICATION PROCEDURES (Excluding Particles Larger Than 3 Inches and Basing Fractions on Estimated Weights)			GROUP SYMBOL	TYPICAL NAMES
GRAVELS (50%(+)>1/4"Ø	CLEAN GRAVELS (Low % Fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
		Predominantly one size or a range of sizes with some intermediate sizes missing.	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.
	GRAVELS W/FINES (High % Fines)	Non-plastic fines (for identification procedures, see ML)	GM	Silty gravels, poorly graded gravel-sand-silt mixtures.
		Plastic fines (for identification procedures, see CL)	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.
SANDS 50%(+)<1/4"Ø	CLEAN SANDS (Low % Fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.	SW	Well graded sand, gravelly sands, little or no fines.
		Predominantly one size or a range of sizes with some intermediate sizes missing.	SP	Poorly graded sands, gravelly sands, little or no fines.
	SANDS W/FINES (High % Fines)	Non-plastic fines (for identification procedures, see ML)	SM	Silty sands, poorly graded sand-silt mixtures.
		Plastic fines (for identification procedures, see CL)	SC	Clayey sands, poorly graded sand-clay mixtures.

FINE-GRAINED SOILS
More Than Half of Material is SMALLER Than No. 200 Sieve Size

FIELD IDENTIFICATION PROCEDURES (Excluding Particles Larger Than 3 Inches and Basing Fractions on Estimated Weights) — Identification Procedures on Fraction Smaller than No. 40 Sieve Size	DRY STRENGTH (Crushing Characteristics)	DILATANCY (Reaction to Shaking)	TOUGHNESS (Consistency Near Plastic Limit)	GROUP SYMBOL	TYPICAL NAMES
SILTS AND CLAYS Liquid Limit <50	None to Slight	Quick to Slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity.
	Medium to High	None to Very Slow	Medium	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
	Slight to Medium	Slow	Slight	OL	Organic silts and organic silt-clays of low plasticity.
SILTS AND CLAYS Liquid Limit >50	Slight to Medium	Slow to None	Slight to Medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
	High to Very High	None	High	CH	Inorganic clays of high plasticity, fat clays.
	Medium to High	None to Very Slow	Slight to Medium	OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS	Readily identified by color, odor, spongy feel and frequently by fibrous texture.			Pt	Peat and other organic soils

Boundary classifications: Soils possessing characteristics of two groups are designated by combining group symbols. For example, GW-GC, well graded gravel-sand mixture with clay binder.
All sieve sizes on this chart are U.S. Standard.

DENSITY OF GRANULAR SOILS

DESIGNATION	STANDARD PENETRATION RESISTANCE-BLOWS/FOOT
Very Loose	0-4
Loose	5-10
Medium Loose	11-30
Dense	31-50
Very Dense	Over 50

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNC. COMPRESSIVE STRENGTH (TONS/SQ. FT.)	STANDARD PENETRATION RESISTANCE-BLOWS/FOOT	FIELD IDENTIFICATION METHODS
Very Soft	Less than 0.25	0 to 2	Easily pentrated several inches by fist
Soft	0.25 to 0.50	2 to 4	Easily penetrated several inches by thumb.
Medium Stiff	0.50 to 1.0	4 to 8	Can be penetrated several inches by thumb.
Stiff	1.0 to 2.0	8 to 15	Readily indented by thumb.
Very Stiff	2.0 to 4.0	15 to 30	Readily indented by thumbnail.
Hard	More than 4.0	Over 30	Indented with difficulty by thumbnail.

ROCK TERMS

ROCK HARDNESS (FROM CORE SAMPLES)

Descriptive Terms	Screwdriver or Knife Effects	Hammer Effects
Soft	Easily Gouged	Crushes when pressed with hammer
Medium Soft	Can be Gouged	Breaks (one blow); crumbly edges
Medium Hard	Can be scratched	Breaks (one blow); sharp edges
Hard	Cannot be scratched	Breaks conchoidally (several blows); sharp edges

ROCK BROKENESS

Descriptive Terms	Abbreviation	Spacing
Very Broken	(V. Br.)	0-2"
Broken	(Br.)	2"-1'
Blocky	(Bl.)	1'-3'
Massive	(M.)	3'-10'

LEGEND:

SOIL SAMPLES - TYPES

S-2" Split-Barrel Sample
ST-3" O.D. Undisturbed Sample
O - Other Samples, Specify in Remarks

ROCK SAMPLES - TYPES

X-NX (Conventional) Core (-2-1/8" O.D.)
Q-NQ (Wireline) Core (-1-7/8" O.D.)
Z - Other Core Sizes, Specify in Remarks

WATER LEVELS

12/18 ▼ 12.6' Initial Level w/Date & Depth
12/18 ▼ 12.6' Stabilized Level w/Date & Depth

ATTACHMENT C-5
EXAMPLE OVERBURDEN MONITORING WELL SHEET

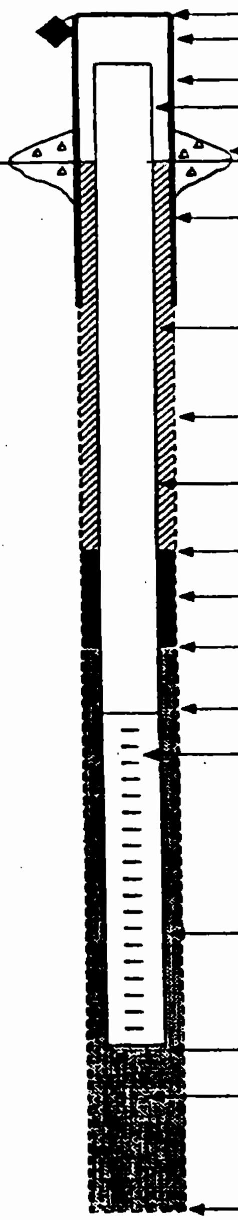
BORING NO.: ________

OVERBURDEN MONITORING WELL SHEET

PROJECT ________ LOCATION ________
PROJECT NO. ________ BORING ________
ELEVATION ________ DATE ________
FIELD GEOLOGIST ________

DRILLER ________
DRILLING METHOD ________
DEVELOPMENT METHOD ________

GROUND ELEVATION



ELEVATION OF TOP OF SURFACE CASING: ________
ELEVATION OF TOP OF RISER PIPE: ________
STICK - UP TOP OF SURFACE CASING: ________
STICK - UP RISER PIPE: ________
TYPE OF SURFACE SEAL: ________
I.D. OF SURFACE CASING: ________
TYPE OF SURFACE CASING: ________
RISER PIPE I.D. ________
TYPE OF RISER PIPE: ________
BOREHOLE DIAMETER: ________
TYPE OF BACKFILL: ________
ELEVATION / DEPTH TOP OF SEAL: ____/____
TYPE OF SEAL: ________
DEPTH TOP OF SAND PACK: ________
ELEVATION / DEPTH TOP OF SCREEN: ____/____
TYPE OF SCREEN: ________
SLOT SIZE x LENGTH: ________
I.D. OF SCREEN: ________
TYPE OF SAND PACK: ________
ELEVATION / DEPTH BOTTOM OF SCREEN: ____/____
ELEVATION / DEPTH BOTTOM OF SAND PACK: ____/____
TYPE OF BACKFILL BELOW OBSERVATION WELL: ________
ELEVATION / DEPTH OF HOLE: ____/____

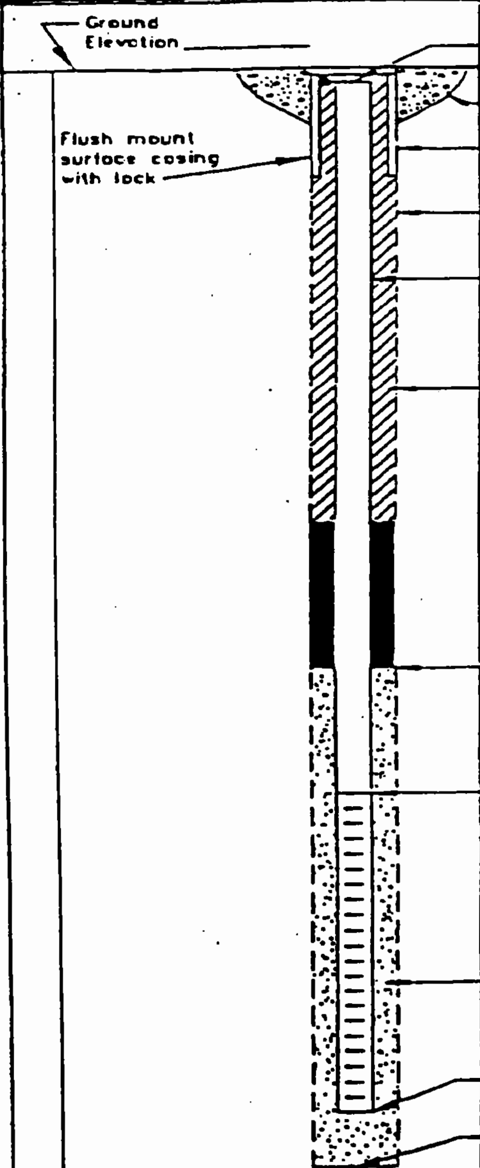
ATTACHMENT C-5A
EXAMPLE OVERBURDEN MONITORING WELL SHEET (FLUSHMOUNT)

BORING NO.: ______

MONITORING WELL SHEET

PROJECT ______ LOCATION ______
PROJECT NO. ______ BORING ______
ELEVATION ______ DATE ______
FIELD GEOLOGIST ______

DRILLER ______
DRILLING METHOD ______
DEVELOPMENT METHOD ______



ELEVATION TOP OF RISER: ______

TYPE OF SURFACE SEAL: ______

TYPE OF PROTECTIVE CASING: ______
I.D. OF PROTECTIVE CASING: ______

DIAMETER OF HOLE: ______

TYPE OF RISER PIPE: ______
RISER PIPE I.D.: ______

TYPE OF BACKFILL/SEAL: ______
______

DEPTH/ELEVATION TOP OF SAND: ______ / ______

DEPTH/ELEVATION TOP OF SCREEN: ______ / ______
TYPE OF SCREEN: ______
SLOT SIZE x LENGTH: ______

TYPE OF SAND PACK: ______

DIAMETER OF HOLE IN BEDROCK: ______

DEPTH/ELEVATION BOTTOM OF SCREEN: ______ / ______
DEPTH/ELEVATION BOTTOM OF SAND: ______ / ______
DEPTH/ELEVATION BOTTOM OF HOLE: ______ / ______
BACKFILL MATERIAL BELOW SAND: ______

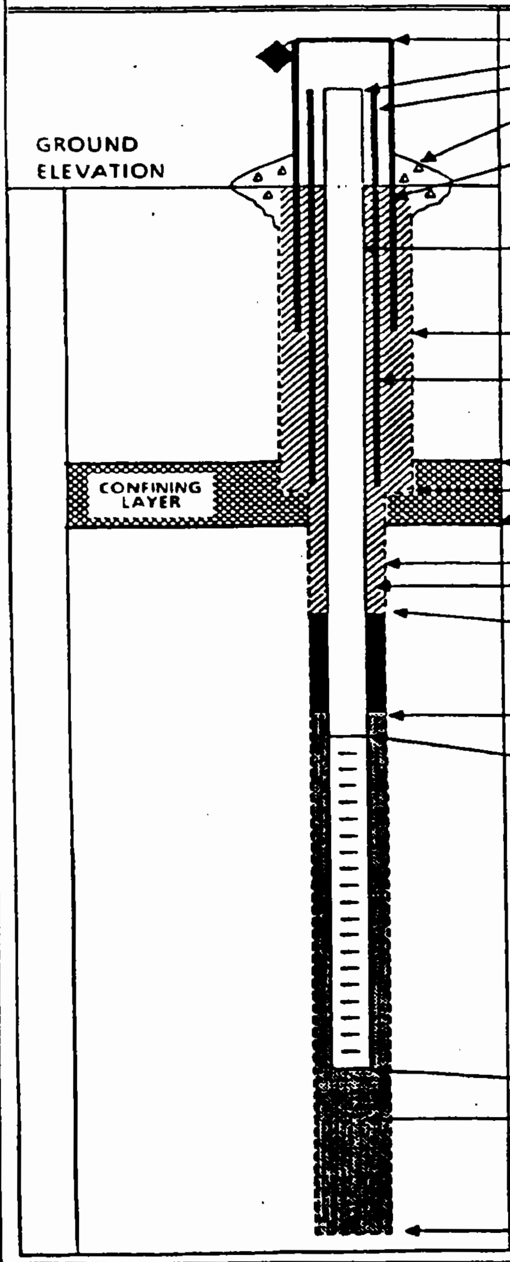
ATTACHMENT C-6
EXAMPLE CONFINING LAYER MONITORING WELL SHEET

BORING NO.: ____________

CONFINING LAYER
MONITORING WELL SHEET

PROJECT ____________ LOCATION ____________
PROJECT NO. ____________ BORING ____________
ELEVATION ____________ DATE ____________
FIELD GEOLOGIST ____________

DRILLER ____________
DRILLING METHOD ____________
DEVELOPMENT METHOD ____________



ELEVATION OF TOP OF SURFACE CASING : ____________
ELEVATION OF TOP OF RISER PIPE: ____________
ELEVATION TOP OF PERM. CASING: ____________
TYPE OF SURFACE SEAL: ____________

I.D. OF SURFACE CASING: ____________
TYPE OF SURFACE CASING: ____________

RISER PIPE I.D. ____________
TYPE OF RISER PIPE: ____________

BOREHOLE DIAMETER: ____________

PERM. CASING I.D. ____________
TYPE OF CASING & BACKFILL: ____________

ELEVATION / DEPTH TOP CONFINING LAYER: ____________
ELEVATION / DEPTH BOTTOM OF CASING: ____________
ELEVATION / DEPTH BOT. CONFINING LAYER: ____________

BOREHOLE DIA. BELOW CASING: ____________
TYPE OF BACKFILL: ____________

ELEVATION / DEPTH TOP OF SEAL: ____________
TYPE OF SEAL: ____________

DEPTH TOP OF SAND PACK: ____________

ELEVATION/DEPTH TOP OF SCREEN: ____________
TYPE OF SCREEN: ____________

TYPE OF SAND PACK: ____________

ELEVATION / DEPTH BOTTOM OF SCREEN: ____________

ELEVATION / DEPTH BOTTOM OF SAND PACK: ____________
TYPE OF BACKFILL BELOW OBSERVATION WELL: ____________

ELEVATION / DEPTH OF HOLE: ____________

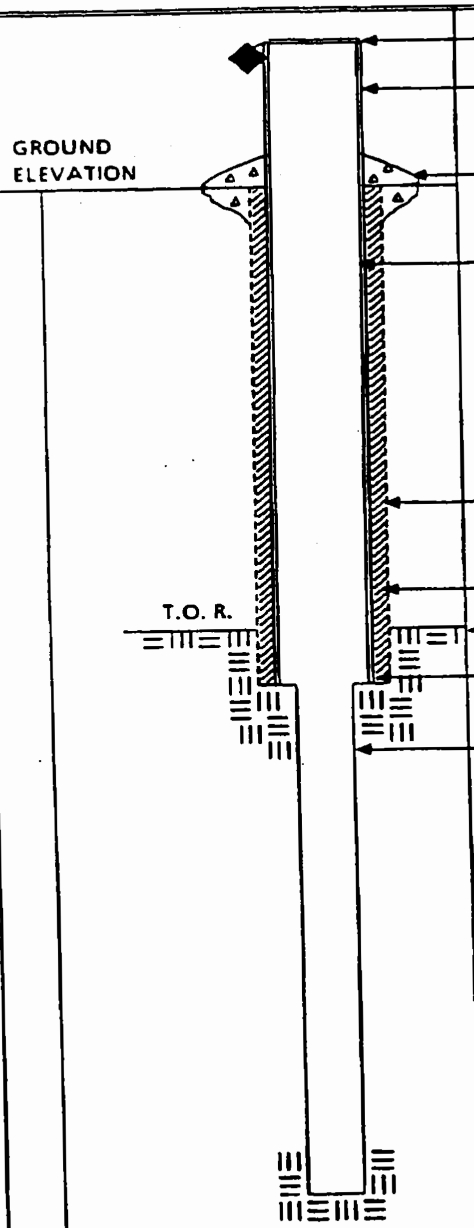
ATTACHMENT C-7
EXAMPLE BEDROCK MONITORING WELL SHEET - OPEN HOLE WELL

BORING NO.: ____________

BEDROCK MONITORING WELL SHEET
OPEN HOLE WELL

PROJECT ____________ LOCATION ____________
PROJECT NO. ____________ BORING ____________
ELEVATION ____________ DATE ____________
FIELD GEOLOGIST ____________

DRILLER ____________
DRILLING METHOD ____________
DEVELOPMENT METHOD ____________



ELEVATION OF TOP OF CASING: ____________

STICK UP OF CASING ABOVE GROUND SURFACE: ____________

TYPE OF SURFACE SEAL: ____________
____

I.D. OF CASING: ____________
TYPE OF CASING: ____________

TEMP. / PERM.: ____________

DIAMETER OF HOLE: ____________

TYPE OF CASING SEAL: ____________

DEPTH TO TOP OF ROCK: ____________

DEPTH TO BOTTOM CASING: ____________

DIAMETER OF HOLE IN BEDROCK: ____________

DESCRIBE IF CORE / REAMED WITH BIT:
____
____
____

DESCRIBE JOINTS IN BEDROCK AND DEPTH:
____
____
____

ELEVATION / DEPTH OF HOLE: ______/______

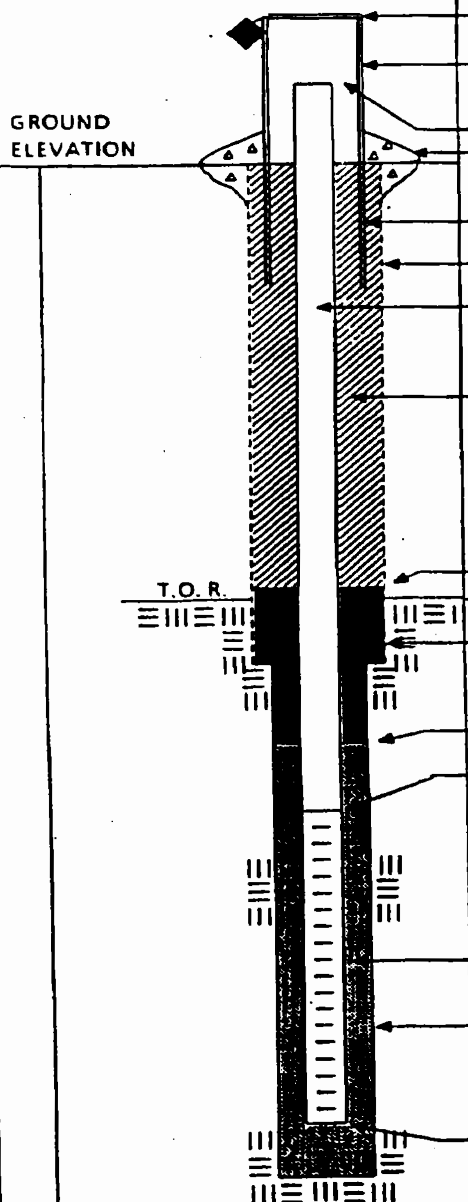
ATTACHMENT C-8
EXAMPLE BEDROCK MONITORING WELL SHEET - WELL INSTALLED IN BEDROCK

BORING NO.: ____________

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT ____________ LOCATION ____________
PROJECT NO. ____________ BORING ____________
ELEVATION ____________ DATE ____________
FIELD GEOLOGIST ____________

DRILLER ____________
DRILLING METHOD ____________
DEVELOPMENT METHOD ____________



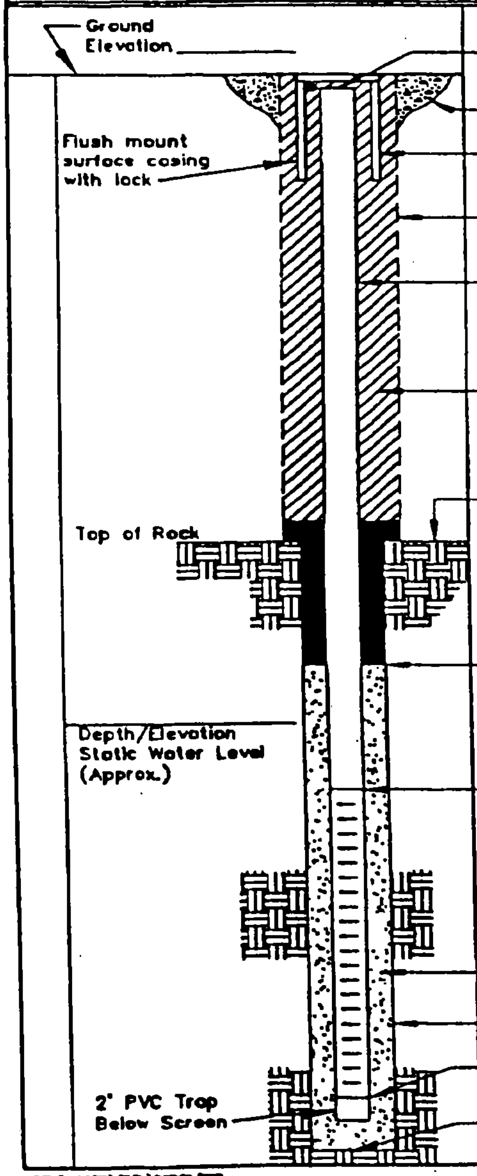
ELEVATION OF TOP OF SURFACE CASING: ____________
STICK UP OF CASING ABOVE GROUND SURFACE: ____________
ELEVATION TOP OF RISER: ____________
TYPE OF SURFACE SEAL: ____________
____
I.D. OF SURFACE CASING: ____________
DIAMETER OF HOLE: ____________
RISER PIPE I.D.: ____________
TYPE OF RISER PIPE: ____________
____
TYPE OF BACKFILL: ____________
____
____
ELEVATION / DEPTH TOP OF SEAL: ______/______
ELEVATION / DEPTH TOP OF BEDROCK: ______/______
TYPE OF SEAL: ____________
____
ELEVATION / DEPTH TOP OF SAND: ______/______
ELEVATION / DEPTH TOP OF SCREEN: ______/______
TYPE OF SCREEN: ____________
SLOT SIZE x LENGTH: ____________
I.D. SCREEN: ____________
TYPE OF SAND PACK: ____________
____
DIAMETER OF HOLE IN BEDROCK:
CORE / REAM: ____________
____
ELEVATION / DEPTH BOTTOM SCREEN: ______/______
ELEVATION / DEPTH BOTTOM OF HOLE: ______/______

ATTACHMENT C-8A
EXAMPLE BEDROCK MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK (FLUSHMOUNT)

BORING NO.: ____________

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT: ____________	LOCATION: ____________	DRILLER: ____________
PROJECT NO.: ____________	BORING: ____________	DRILLING METHOD: ____________
ELEVATION: ____________	DATE: ____________	DEVELOPMENT METHOD: ____________
FIELD GEOLOGIST: ____________		



ELEVATION TOP OF RISER: ____________

TYPE OF SURFACE SEAL: ____________

TYPE OF PROTECTIVE CASING: ____________

I.D. OF PROTECTIVE CASING: ____________

DIAMETER OF HOLE: ____________

TYPE OF RISER PIPE: ____________

RISER PIPE I.D.: ____________

TYPE OF BACKFILL/SEAL: ____________

____

DEPTH/ELEVATION TOP OF BEDROCK: ______/______

DEPTH/ELEVATION TOP OF SAND: ______/______

DEPTH/ELEVATION TOP OF SCREEN: ______/______

TYPE OF SCREEN: ____________

SLOT SIZE x LENGTH: ____________

TYPE OF SAND PACK: ____________

DIAMETER OF HOLE IN BEDROCK: ____________

DEPTH/ELEVATION BOTTOM OF SCREEN: ______/______

DEPTH/ELEVATION BOTTOM OF SAND: ______/______

DEPTH/ELEVATION BOTTOM OF HOLE: ______/______

BACKFILL MATERIAL BELOW SAND: ____________

ATTACHMENT C-9
EXAMPLE TEST PIT LOG

TEST PIT LOG

Brown & Root Environmental

PROJECT: ____________________ TEST PIT NO.: ______

PROJECT NO ____________ DATE: ____________

LOCATION: ____________________

FIELD GEOLOGIST: ____________________

DEPTH (Ft.)	LITHOLOGY CHANGE (Depth/Ft.)	MATERIAL DESCRIPTION (Soil Density / Consistency, Color)	USCS	REMARKS

Test Pit Cross Section and / or Plan View

REMARKS ____________________

PHOTO LOG ____________________

TEST PIT ______

PAGE ____ OF ____

ATTACHMENT D
EXAMPLE EQUIPMENT CALIBRATION LOG

Brown & Root Environmental

EQUIPMENT CALIBRATION LOG

INSTRUMENT NAME / MODEL: ______________

MANUFACTURER: ______________

JOB NAME: ______________

JOB NUMBER: ______________

CALIBRATION DATE	INITIAL SETTINGS	STANDARDS USED	PROCEDURE	ADJUSTMENTS MADE	FINAL SETTINGS	SIGNATURE	COMMENTS

ATTACHMENT E
EXAMPLE DAILY ACTIVITIES RECORD

Brown & Root Environmental

DAILY ACTIVITIES RECORD

PROJECT ______ LOCATION ______

CLIENT ______ ARRIVAL TIME ______ JOB NO. ______

DATE ______ DEPARTURE TIME ______

CONTRACTOR ______ DRILLER ______

BORING NO. ______ HNUS REPRESENTATIVE ______

ITEM	QUANTITY ESTIMATE	QUANTITY TODAY	PREVIOUS TOTAL QUANTITY	CUMULATIVE QUANTITY TO DATE

COMMENTS: ______

APPROVED BY:

HNUS FIELD REPRESENTATIVE ______ DRILLER OR REPRESENTATIVE ______

ATTACHMENT F
FIELD TRIP SUMMARY REPORT
PAGE 1 OF 2

SUNDAY

Date: ______________________ Personnel: ______________________

Weather: ______________________ Onsite: ______________________

Site Activities: ____

____

____

____

MONDAY

Date: ______________________ Personnel: ______________________

Weather: ______________________ Onsite: ______________________

Site Activities: ____

____

____

____

TUESDAY

Date: ______________________ Personnel: ______________________

Weather: ______________________ Onsite: ______________________

Site Activities: ____

____

____

____

WEDNESDAY

Date: ______________________ Personnel: ______________________

Weather: ______________________ Onsite: ______________________

Site Activities: ____

____

____

____

ATTACHMENT F
PAGE 2 OF 2
FIELD TRIP SUMMARY REPORT

THURSDAY

Date: ______________________ Personnel: ______________________
Weather: ______________________ Onsite: ______________________

Site Activities: ______________________

FRIDAY

Date: ______________________ Personnel: ______________________
Weather: ______________________ Onsite: ______________________

Site Activities: ______________________

SATURDAY

Date: ______________________ Personnel: ______________________
Weather: ______________________ Onsite: ______________________

Site Activities: ______________________

APPENDIX E

HEALTH AND SAFETY PLAN

Draft Health and Safety Plan
for
Contamination Assessment
at the
Fuel Farm Containing Storage Tanks 681 and 682

Naval Air Station
Pensacola, Florida

Southern Division
Naval Facilities Engineering Command
Contract No. N62467-94-D-0888
Contract Task Order 0098

April 1999

DRAFT HEALTH AND SAFETY PLAN
FOR
CONTAMINATION ASSESSMENT
AT THE FUEL FARM CONTAINING
STORAGE TANKS 681 AND 682

NAVAL AIR STATION
PENSACOLA, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION-NAVY (CLEAN) CONTRACT

Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive
Pittsburgh, Pennsylvania 15222

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0098

APRIL 1999

SUBMITTED BY:	APPROVED BY:
TERRY HANSEN, P.G. TASK ORDER MANAGER TETRA TECH NUS, INC. TALLAHASSEE, FLORIDA	MATTHEW M. SOLTIS, CIH, CSP CLEAN HEALTH & SAFETY MANAGER TETRA TECH NUS, INC. PITTSBURGH, PENNSYLVANIA

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FIGURES

1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been written to encompass investigation activities that are to be conducted at the Fuel Farm containing Storage Tanks 681 and 682 (Fuel Farm) at Naval Air Station Pensacola (NAS Pensacola), Pensacola, Florida as part of Contract Task Order (CTO) 0098. Specifically, this HASP addresses the contamination assessment activities to be conducted to determine the nature and extent of releases of petroleum constituents at the Tank Farm. This HASP is being prepared for NAS Pensacola as part of an overall effort conducted under Comprehensive Long-Term Environmental Action Navy (CLEAN III) administered through the U.S. Navy Southern Division Naval Facilities Engineering Command (NAVFAC), as defined under Contract Number N62467-94-D-0888. In addition to the HASP, a copy of the Tetra Tech NUS, Inc. (TtNUS) Environmental Health and Safety Guidance Manual must be present at the site during the performance of site activities. The Guidance Manual provides supporting information pertaining to the HASP, as well as TtNUS Standard Operating Procedures (SOP's). Both documents must be present at the site to comply with the requirements stipulated in the Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.120.

This HASP has been developed using the latest available information regarding known or suspected chemical contaminants and potential physical hazards associated with the proposed work and site. The HASP will be modified, if new information becomes available. All changes to the HASP will be made by the Project Health & Safety Officer (PHSO) and approved by the TtNUS CLEAN Health and Safety Manager (HSM) and the Task Order Manager (TOM). The TOM will notify affected personnel of all changes.

1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site safety and health for TtNUS and subcontractor employees engaged in onsite activities. Personnel assigned to these positions will exercise the primary responsibility for all onsite health and safety. These persons will be the primary points of contact for any questions regarding the safety and health procedures and the selected control measures that are to be implemented for onsite activities.

- The TtNUS TOM is responsible for the overall direction of health and safety for this project.

- The PHSO is responsible for developing this HASP in accordance with applicable OSHA regulations. Specific responsibilities include:

i. Providing information regarding site contaminants and physical hazards associated with the site.
ii. Establishing air monitoring and decontamination procedures.
iii. Assigning personal protective equipment based on task and potential hazards.
iv. Determining emergency response procedures and emergency contacts.
v. Stipulating training requirements and reviewing appropriate training and medical surveillance certificates.
vi. Providing standard work practices to minimize potential injuries and exposures associated with hazardous waste work.
vii. Modify this HASP, as it becomes necessary.

- The TtNUS Field Operations Leader (FOL) is responsible for implementation of the HASP with the assistance of an appointed SSO. The FOL manages field activities, executes the work plan, and enforces safety procedures as applicable to the work plan.

- The SSO supports site activities by advising the FOL on all aspects of health and safety on site. These duties may include:

i. Coordinates all health and safety activities with the FOL.
ii. Selects, applies, inspects, and maintains personal protective equipment.
iii. Establishes work zones and control points in areas of operation.
iv. Implements air monitoring program for onsite activities.
v. Verifies training and medical clearance of onsite personnel status in relation to site activities.
vi. Implements Hazard Communication, Respiratory Protection Programs, and other associated health and safety programs as they may apply to site activities.
vii. Coordinates emergency services.
viii. Provides site-specific training for all onsite personnel.
ix. Investigates all accidents and injuries (see Attachment I - Illness/Injury Procedure and Report Form)
x. Provides input to the PHSO regarding the need to modify, this HASP, or applicable health and safety associated documents as per site-specific requirements.

- Compliance with the requirements stipulated in this HASP is monitored by the SSO and coordinated through the TtNUS CLEAN HSM.

Note: In some cases one person may be designated responsibilities for more than one position. For example, at NAS Pensacola the FOL may also be responsible for SSO duties. This action will be performed only as credentials, experience, and availability permits.

1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: Naval Air Station Pensacola   Address: Pensacola, Florida

Navy Engineer-in-Charge: B. K. Moring   Phone Number: (843) 820-5514

Navy Environmental Coordinator: Ron Joyner   Phone Number: (850) 452-4611

Purpose of Site Visit: This activity is divided into a multi-task operation (see Section 4.0), including soil boring (drilling), multi-media sampling, and other related activities.

Proposed Dates of Work: May 1999

Project Team:

TtNUS Personnel:	**Discipline/Tasks Assigned:**
Terry Hansen, P.G.	Task Order Manager (TOM)
TBD	Field Operations Leader (FOL)
Matthew M. Soltis, CIH, CSP	CLEAN Health and Safety Manager (HSM)
Delwyn E. Kubeldis, CIH, CSP	Project Health and Safety Officer (PHSO)
TBD	Site Safety Officer (SSO)

Non-TtNUS Personnel	**Affiliation/Discipline/Tasks Assigned**
TBD	Drilling Subcontractor(s)
TBD	

Prepared By: Delwyn E. Kubeldis, CIH, CSP

TBD - To be determined

2.0 EMERGENCY ACTION PLAN

2.1 INTRODUCTION

This section has been developed as part of a preplanning effort to direct and guide field personnel in the event of an emergency. In the event of onsite emergencies that cannot be handled by onsite personnel, they will be evacuated to a safe place of refuge, and the appropriate emergency response agencies will be notified. Because a majority of potential emergency situations will require assistance from outside emergency responders, TtNUS and subcontractor personnel will not provide emergency response support for significant emergency events beyond responding to easily-controlled minor incidents. The emergency response agencies listed in this plan are capable of providing the most effective response and are designated as the primary responders. These agencies are located within a reasonable distance from the area of operations, a factor that ensures adequate emergency response time. This emergency action plan conforms to the requirements of OSHA Standard 29 CFR 1910.38(a), as allowed in OSHA 29 CFR 1910.120(l)(1)(ii).

TtNUS will, through necessary services, include initial response measures for incidents such as:

- Incipient fire-fighting support and prevention
- Incipient spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Provision of initial medical support for injury/illness requiring only first-aid level support
- Provision of site control and security measures as necessary

2.2 PRE-EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, injury or illness resulting from exposure to chemical or physical hazards or fire are the most probable emergencies that can be encountered during site activities. To minimize and eliminate these potential emergency situations, pre-emergency planning activities associated with this project include the following. The SSO and/or the FOL are responsible for:

- Coordinating response actions with NAS Pensacola Emergency Services personnel to ensure that TtNUS emergency action activities are compatible with existing facility emergency response procedures.

- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information includes the following:

  - Chemical Inventory (for substances used onsite), with Material Safety Data Sheets.
  - Onsite personnel medical records (medical data sheets).
  - A logbook identifying personnel onsite each day.
  - Emergency notification phone numbers in all site vehicles

- Identifying a chain or command for emergency action.
- Educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible.

It is the responsibility of the TtNUS FOL to ensure that this information is available and present at the site.

2.3 EMERGENCY RECOGNITION AND PREVENTION

2.3.1 Recognition

Foreseeable emergency situations that may be encountered during site activities will generally be recognizable by visual observation. A clear knowledge of the signs and symptoms of overexposure to contaminants of concern may alert personnel of the potential hazards concerning themselves or their fellow workers. These potential hazards, the activities with which they have been associated, and the recommended control methods are discussed in detail in sections 5.0 and 6.0 of this document. Additionally, early recognition will be supported by periodic site surveys to eliminate any conditions that may predispose site personnel or properties to an emergency. The FOL and the SSO will constitute the site evaluation committee responsible for these periodic surveys. Site surveys will be conducted at least once a week during the initiation of this effort.

The above actions will provide early recognition for potential emergency situations. Should an incident take place, TtNUS will take defensive and offensive measures to control these situations. However, if the FOL and/or the SSO determine that an incident has progressed to a serious emergency situation, TtNUS will withdraw, and notify the appropriate response agencies.

2.3.2 Prevention

TtNUS and subcontractor personnel will minimize the potential for emergencies by ensuring compliance with the HASP, the Health and Safety Guidance Manual, applicable OSHA regulations, and through periodic site surveys of work areas.

2.4 SAFE DISTANCES AND PLACES OF REFUGE

In the event that the site must be evacuated, all personnel will immediately stop activities and report to the FOL at the place of safe refuge. Safe places of refuge will be determined prior to commencement of site activities and will be conveyed to personnel as part of the daily safety meeting conducted each morning. Upon reporting to the refuge location, personnel will remain there until directed otherwise by the TtNUS FOL. The FOL or the SSO will take a head count at this location to confirm the location of all site personnel. The site logbook will be used to take the head count. Places of refuge will ideally be selected which offer a point for communication purposes should this be required.

2.5 EVACUATION ROUTES AND PROCEDURES

Once an evacuation is initiated, personnel will proceed immediately to the designated place of refuge, unless doing so would further jeopardize the welfare of workers. In such event, personnel will proceed to a designated alternate location (to be identified) and remain there until further notification from the FOL. The use of these locations as assembly points provides communication and a direction point for emergency services, should they be needed.

Evacuation procedures will be discussed prior to the initiation of any work at the site. This shall include identifying primary and secondary evacuation routes and assembly points. Evacuation routes from the site are dependent upon the location at which work is being performed and the circumstances under which an evacuation is required. Additionally, site location and meteorological conditions (i.e., wind speed and direction) will influence the designation of evacuation routes. As a result, assembly points at NAS will be selected, and in the event of an emergency, field personnel will proceed to these points by the most direct route possible without further endangering themselves.

2.6 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

Since TtNUS personnel will not always be working in the proximity of each other, hand signals, voice commands, air horns, and two-way radios (approved by NAS personnel) will comprise the mechanisms to alert site personnel of an emergency.

If an incident occurs, site personnel will initiate the following procedures:

- Initiate incident alerting procedures (if needed) verbally, by air horn, or using two-way radios.
- Evacuate non-essential personnel.
- Initiate incipient response procedures.
- Describe to the FOL (who will serve as the Incident Commander) what has occurred in as much detail as possible.

In the event that site personnel cannot control the incident through offensive and/or defensive measures, the FOL and/or the SSO will enact emergency notification procedure to secure additional outside assistance in the following manner:

- Call 911 for outside emergency service and report the emergency to the NAS Pensacola Emergency Dispatch - (850) 452-3333 (See Table 2-1)
- Give the emergency operator the location of the emergency and a brief description of what has occurred.
- Stay on the phone follow the instructions given by the operator
- The appropriate agency will be notified and dispatched

If an incident occurs at NAS Pensacola outside of designated operating areas impacting field personnel, the following procedures are to be initiated:

- Initiate an evacuation (if needed) by voice commands, hand signals, air horns, or two-way radio.
- Call Navy On-Site Representative
- Proceed to the assembly points as directed by NAS Pensacola personnel.

2.7 EMERGENCY CONTACTS

Prior to initiating field activities, all personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an accident. Table 2-1 provides a list of emergency contacts and their associated telephone numbers. This table must be posted where it is readily available to all site personnel. Facility maps should also be posted showing potential evacuation routes and designated meeting areas.

TABLE 2-1

**EMERGENCY CONTACTS
NAS PENSACOLA**

AGENCY	TELEPHONE
EMERGENCY (outside services) (Police, Fire, and Ambulance Services)	911
NAS Pensacola - Emergency Dispatch	(850) 452-3333
Navy Engineer-in-Charge B. K. Moring	(843) 820-5514
Navy Environmental Coordinator Ron Joyner	(850) 452-4611
Navy Hospital (Emergency Care only)	(850) 505-6600
Baptist Hospital (Non-emergency Care)	(850)469-2313
TtNUS Tallahassee Office and Task Order Manager (Terry Hansen)	(850) 656-5458
CLEAN Health and Safety Manager Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer Delwyn E. Kubeldis, CIH, CSP	(412) 921-8529
Continuum Healthcare	(800) 229-3674

2.8 EMERGENCY ROUTE TO HOSPITAL

For emergency care only, non-Navy personnel are permitted to go to the Navy Hospital.

Navy Hospital
Highway 98
Pensacola, Florida
(850) 505-6600

Directions to the Navy Hospital from the site are as follows:

Proceed out of NAS Main Gate (Navy Blvd) heading north to US Highway 98. Turn left (heading west) on US 98 and proceed approximately 1 mile. Hospital will be on the right (Building 2268).

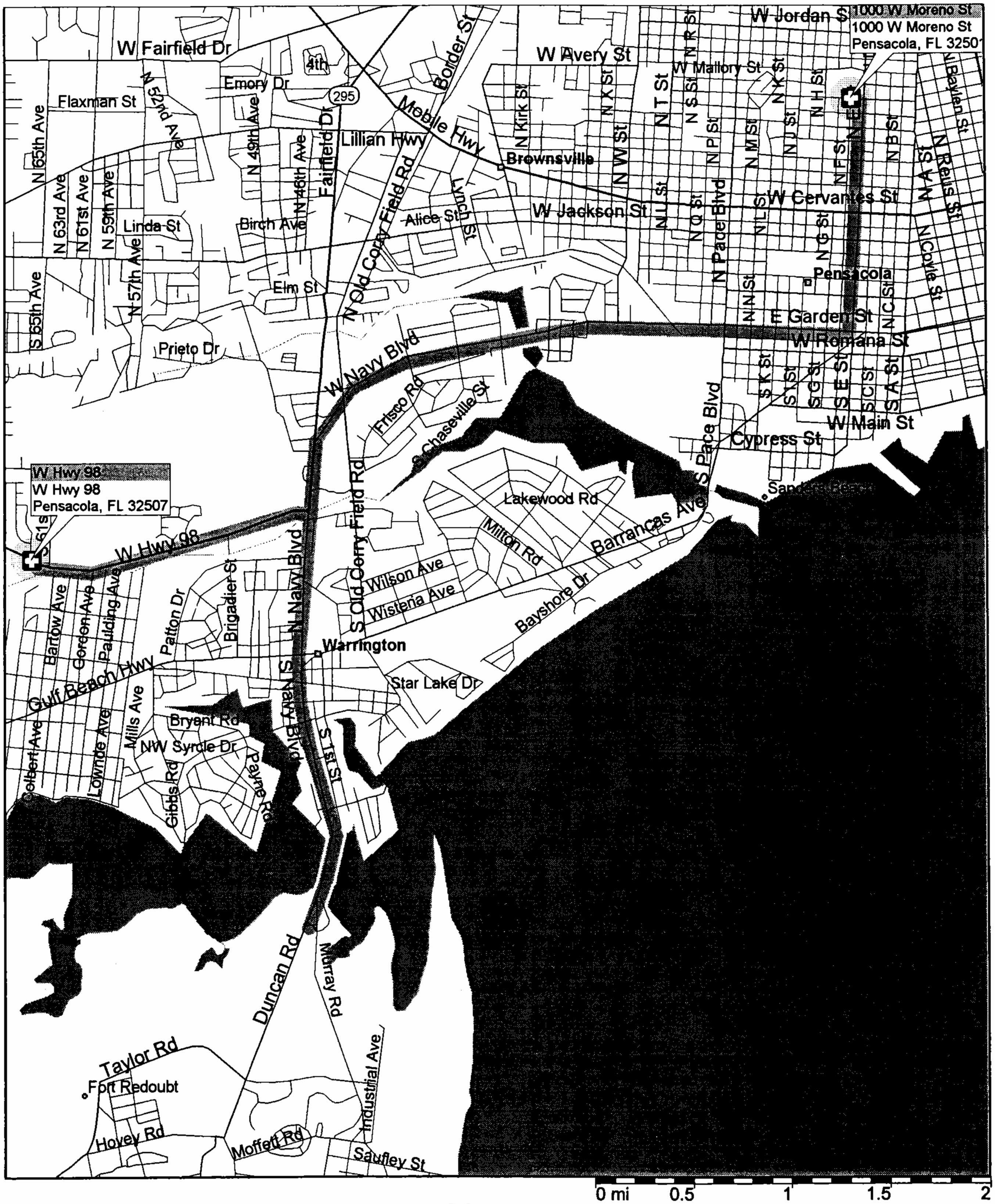
A map indicating the travel route from the site to the Navy Hospital will be inserted as Figure 2-1.

Baptist Hospital (850-469-2313) will be used for all non-emergency care services. Directions to this Hospital are:

Proceed out of NAS Main Gate (Navy Blvd) heading north to Hwy 292. Turn right (heading east) on Hwy 292 until it turns into Garden Street (approx. 3 miles). Take Garden Street to intersection with "E" Street. Turn left onto "E" Street and proceed approximately 1 mile to Hospital on left.

Hospital Route, NAS Pensacola Tanks 681 & 682

Routes to Navy Hospital(W Hwy 98)and Baptist Hospital(1000 W Moreno St.)



Microsoft Expedia.

Streets98

FIGURE 2-1

Route to Hospital

2.9 DECONTAMINATION PROCEDURES/EMERGENCY MEDICAL TREATMENT

During any site evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. Decontamination will not be performed if the incident warrants immediate evacuation. However, it is unlikely that an evacuation would occur which would require workers to evacuate the site without first performing the necessary decontamination procedures.

TtNUS personnel will perform removal of personnel from emergency situations and may provide initial medical support for injury/illnesses requiring only first-aid level support. Medical attention above that level will require assistance and support from the designated emergency response agencies. **If the emergency involves personnel exposures to chemicals, follow the steps provided in Figure 2-2.**

2.10 INJURY/ILLNESS REPORTING

If any TtNUS personnel are injured or develop an illness as a result of working on site, the TtNUS "Injury/Illness Procedure" (Attachment I) must be followed. Following this procedure is necessary for documenting all of the information obtained at the time of the incident. Also, as soon as possible Navy contact Ron Joyner must be informed of any incident or accident that requires medical attention.

Any pertinent information regarding allergies to medications or other special conditions will be provided to medical services personnel. This information is listed on Medical Data Sheets filed onsite. If an exposure to hazardous materials has occurred, provide information on the chemical, physical, and toxocological properties of the subject chemical(s) to medical service personnel.

FIGURE 2-2
EMERGENCY RESPONSE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of exposure situations. In the event of a personnel exposure to a hazardous substance or agent:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e. ambulance for serious events)
- Obtain as much exposure history as possible (a Potential Exposure report is attached).
- If the exposed person is a Tetra Tech NUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the Continuum Healthcare physician. Continuum Healthcare will contact the medical facility and request specific testing which may be appropriate. The care of the involved worker will be monitored by Continuum Healthcare physicians. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call Continuum Healthcare at 1-800-229-3674, being prepared to provide:
  - Any known information about the nature of the exposure.
  - As much of the exposure history as was feasible to determine in the time allowed.
  - Name and phone number of the medical facility to which the victim(s) has/have been taken.
  - Name(s) of the exposed Tetra Tech NUS, Inc. employee(s).
  - Name and phone number of an informed site officer who will be responsible for further investigations.
  - Fax appropriate MSDS to Continuum Healthcare at (770) 457-1429.
- Contact Corporate Health and Safety Department (Matt Soltis) at 1-800-245-2730.

As environmental data is gathered and the exposure scenario becomes more clearly defined, this information should be forwarded to the Continuum Healthcare Medical Director or Assistant Medical Director.

Continuum Healthcare will compile the results of all data and provide a summary report of the incident. A copy of this report will be placed in each involved worker's medical file in addition to being distributed to appropriately designated company officials. Each involved worker will receive a letter describing the incident but deleting any personal or individual comments. This generalized summary will be accompanied by a personalized letter describing the findings/results. A copy of the personal letter will be filed in the continuing medical file maintained by Continuum Healthcare.

FIGURE 2-2 (continued)
POTENTIAL EXPOSURE REPORT

Name: ______________________ Date of Exposure: ____________

Social Security No.: ______________ Age: ________ Sex: ________

Client Contact: ______________________ Phone No.: ____________

Company Name: ______________________

I. Exposing Agent

Name of Product or Chemicals (if known):______________________

Characteristics (if the name is not known)

Solid Liquid Gas Fume Mist Vapor

II. Dose Determinants

What was individual doing?______________________

How long did individual work in area before signs/symptoms developed? __________

Was protective gear being used? If yes, what was the PPE? __________

Was there skin contact?______________________

Was the exposing agent inhaled?______________________

Were other persons exposed? If yes, did they experience symptoms? __________

III. Signs and Symptoms (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath
Chest Tightness / Pressure
Nausea / Vomiting
Dizziness
Weakness

Delayed Symptoms:

Weakness
Nausea / Vomiting
Shortness of Breath
Cough
Loss of Appetite
Abdominal Pain
Headache
Numbness / Tingling

IV. Present Status of Symptoms (check off appropriate symptoms)

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath
Chest Tightness / Pressure
Cyanosis
Nausea / Vomiting
Dizziness
Weakness
Loss of Appetite
Abdominal Pain
Numbness / Tingling

Have symptoms: (please check off appropriate response and give duration of symptoms)

Improved: ________ Worsened: ________ Remained Unchanged: ________

V. Treatment of Symptoms (check off appropriate response)

None: ________ Self-Medicated: ________ Physician Treated: ________

3.0 SITE BACKGROUND

NAS Pensacola is located in Escambia County, in Florida's northwest coastal area, approximately 5 miles west of the Pensacola City limits. The 950-acre installation was constructed in the early 1940's. Prior to construction, the facility was undeveloped and sparsely vegetated. Land use at NAS Pensacola consists of various military housing, training, and support facilities as well as large industrial complexes for major repairs and refurbishment of aircraft engines and frames. Additional details on the NAS Pensacola facility may be found in the facility administrative record.

3.1 SITE DESCRIPTION

The Tank Farm is a 1.5 acre fenced-in area containing two cut-and-cover storage tanks (Tanks 681 and 682 with capacities of 1.102 million gallons each) and associated pump houses and underground distribution piping. The tanks were installed in December 1943 to store diesel fuel, however, "Bunker C" and Aviation Gasoline (AVGAS) have also been stored at the site. The tanks are not in service and have been abandoned in place. Each tank is 102.5 feet in diameter and 21 feet in depth.

A Closure Assessment (CA) of the site was performed in April 1995. The results of the CA indicated concentrations of petroleum constituents detected in a sample from on-site monitoring wells in excess of Florida Department of Environmental Regulation (FDER), presently the Florida Department of Environmental Protection (FDEP) groundwater standards. In July 1995, a release of an unknown quantity of petroleum constituents was reported to the FDEP based on the detection of these petroleum constituents.

4.0 SCOPE OF WORK

The following is a list of activities that are covered in this HASP for the contamination assessment to be conducted under CTO 0098:

- Mobilization/demobilization
- Soil boring activities (Direct Push Technology or DPT)
- Monitoring well installation, purging, and development
- Multi-media sampling, including:
  - Soils (surface and subsurface)
  - Groundwater
  - Investigative-Derived Waste (IDW)
- Decontamination of sampling and heavy equipment
- IDW management

For more detailed description of the associated tasks, refer to the Work Plan (WP) and/or Sampling and Analysis Plan (SAP). Any tasks to be conducted outside of the elements listed here will be considered a change in scope requiring modification of this document. The TOM or a designated representative will submit all requested modifications to this document to the HSM.

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARIZATION

Table 5-1 of this section serves as the primary portion of the site-specific HASP which identifies the tasks that are to be performed as part of the scope of work. This table will be modified and incorporated into this document as new or additional tasks are performed at the site. The anticipated hazards, recommended control measures, air-monitoring recommendations, required Personal Protective Equipment (PPE), and decontamination measures for each site task are discussed in detail. This table and the associated control measures shall be changed, if the scope of work, contaminants of concern, or other conditions change.

Through using the table, site personnel can determine which hazards are associated with each task and at each site, and what associated control measures are necessary to minimize potential exposure or injuries related to those hazards. The table also assists field team members in determining which PPE and decontamination procedures to use based on proper air monitoring techniques and site-specific conditions.

As discussed earlier, the Health and Safety Guidance Manual supports this table and HASP. The manual is designed to further explain supporting programs and elements for other site-specific aspects as required by regulatory requirements. The Guidance Manual should be referenced for additional information regarding air monitoring instrumentation, decontamination activities, emergency response, hazard assessments, hazard communication and hearing conservation programs, medical surveillance, PPE, respiratory protection, site control measures, standard work practices, and training requirements. Many of TtNUS' SOPs are also provided in this Guidance Manual.

Safe Work Permits issued for all exclusion zone activities (See Section 9.4 and Attachment IV) will use elements defined in Table 5-1 as the primary reference. The FOL and/or the SSO completing the Safe Work Permit will add additional site-specific information. In situations where the Safe Work Permit is more conservative than the direction provided in Table 5-1, the Safe Work Permit will be followed. As the project develops and more information is gained regarding the contents of buried drums, the SSO will modify the Safe Work Permits to reflect this information.

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TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR
NAVAL AIR STATION – PENSACOLA, PENSACOLA, FLORIDA

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment	Decontamination Procedures
Soil borings using Direct-Push Technology (DPT, such as the Geoprobe®). This task also includes monitoring well installation, development, and purging.	*Chemical Hazards* 1) Primary types of contaminants include VOCs (primarily Aviation Gasoline [AVGAS]) and SVOCs (diesel fuel and waste oils, including general PAHs). Note that these contaminants may be bound to particulates (dusts, soils, etc.) and contact should be avoided whenever possible. None of the site contaminants, however, are anticipated to be present in significant concentrations to present an inhalation hazard. See Table 6-1 for more information on the chemicals of concern. 2) Transfer of contamination into clean areas or onto persons *Physical hazards* 3) Heavy equipment hazards (pinch/compression points, rotating equipment, hydraulic lines, etc.) 4) Noise in excess of 85 dBA 5) Energized systems (contact with underground or overhead utilities) 6) Lifting (strain/muscle pulls) 7) Slip, trips, and falls 8) Vehicular and foot traffic 9) Ambient temperature extremes (heat stress) *Natural hazards* 10) Insect/animal bites and stings 11) Inclement weather	1) Use real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated media (air, water, soils, etc.). Generation of dusts should be minimized. If airborne dusts are observed, area wetting methods may be used. If area wetting methods are not feasible, termination of activities may be used to minimize exposure to excessive airborne dusts. 2) Decontaminate all equipment and supplies between boreholes and prior to leaving the site. 3) All equipment to be used will be - Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600,.601,.602), and manufacturers design and documented as such using Equipment Inspection Sheet (see Attachment III of this HASP). - Operated by knowledgeable operators and ground crew. - Repaired using only manufacturer approved parts and equipment. In addition to the equipment considerations, the following standard operating procedures will be employed: - All personnel not directly supporting the direct push operation will remain at least 25 feet from the point of operation. - All loose clothing/protective equipment will be secured to avoid possible entanglement. - Hand signals will be established prior to the commencement of direct push activities. - A remote sampling device must be used to sample drill cuttings near rotating tools. - Work areas will be kept clear of clutter. - All personnel will be instructed in the location and operations of the emergency shut off device(s). This device will be tested initially (and then periodically) to insure its operational status. - Areas will be inspected prior to the movement of direct push rigs and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SSO. 4) Hearing protection will be used during all subsurface activities. 5) All utility clearances must be obtained, in writing, prior to subsurface activities (contact Ron Joyner). Prior to any subsurface investigations, the locations of all underground utilities must be identified and marked. 6) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 7) Preview work locations for unstable/uneven terrain. 8) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom + 3 feet). - Secure all loose articles to avoid possible entanglement. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements. 9) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress concerns is provided in Attachment V and Section 4 of the TtNUS Health and Safety Guidance Manual. 10) Avoid nesting areas, use repellents. Wear appropriate clothing. Report potential hazards to the SSO. Follow guidance presented in Attachment II of this HASP. 11) Suspend or terminate operations until directed otherwise by SSO.	**It is not anticipated that potential contaminant concentrations at outdoor sample locations will present an inhalation hazard.** A direct reading Photoionization Detector (PID) with a 10.6 eV lamp or higher, or a Flameionization Detector (FID), will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring of the borehole will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions: - Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above daily-established background levels in the breathing zone areas of the at-risk employees requires site activities to be suspended and site personnel to retreat to an unaffected area. - Work may only resume if airborne readings in worker breathing zone areas return to below daily-established background levels. If elevated readings in worker breathing zone persist, the PHSO and HSM will be contacted to determine necessary actions and levels of protection. Site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be performed by observing work conditions for visible dust clouds. Potential exposure to contaminated dust will be controlled using water suppression, by avoiding dust plumes, or evacuating the operation area until dust subsides. Where the utility clearance cannot be determined, subsurface activities shall proceed with extreme caution using hand digging to at least below the frost-line depth (no less than 4 ft. BGS). Also, a magnetometer must be used for periodic down-hole surveys every 2 feet to a depth of at least 10 feet.	All subsurface operations are to be initiated in Level D protection. Level D protection constitutes the following minimum protection - Standard field attire (Sleeved shirt; long pants) - Safety shoes (Steel toe/shank) - Safety glasses - Hardhat - Reflective vest for traffic areas - *Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential exists for soiling work attire.* - *Nitrile gloves or leather gloves with surgical style inner gloves* - Hearing protection during soil boring activities *and for other high noise areas as directed by the SSO.* *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)* **Note:** The Safe Work Permit(s) for this task (see Attachment IV) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.	**Personnel Decontamination** - Will consist of a soap/water wash and rinse for reusable protective equipment (e.g., gloves). This function will take place at an area adjacent to the drilling operations bordering the support zone. This decontamination procedure for Level D protection will consist of - Equipment drop - Soap/water wash and rinse of reusable outer gloves, as applicable - Outer coveralls, boot covers, and/or outer glove removal - Removal, segregation, and disposal of non-reusable PPE in bags/containers provided - Wash hands and face, leave contamination reduction zone.

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment	Decontamination Procedures
Multi-media sampling, including soil, groundwater, and IDW sampling.	*Chemical Hazards* 1) Primary types of contaminants include VOCs (primarily Aviation Gasoline [AVGAS]) and SVOCs (diesel fuel and waste oils, including general PAHs). Note that these contaminants may be bound to particulates (dusts, soils, etc.) and contact should be avoided whenever possible. None of the site contaminants, however, are anticipated to be present in significant concentrations to present an inhalation hazard. See Table 6-1 for more information on the chemicals of concern. 2) Transfer of contamination into clean areas *Physical hazards* 3) Noise in excess of 85 dBA 4) Lifting (strain/muscle pulls) 5) Pinches and compressions 6) Slip, trips, and falls 7) Ambient temperature extremes (heat stress) 8) Vehicular and foot traffic *Natural hazards* 9) Insect/animal bites and stings 10) Inclement weather	1) Use real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated media (air, water, soils, etc.). Generation of dusts should be minimized. If airborne dusts are observed, area wetting methods may be used. If area wetting methods are not feasible, termination of activities may be used to minimize exposure to observed airborne dusts. 2) Decontaminate all equipment and supplies between sampling locations and prior to leaving the site. 3) When sampling at the Geoprobe use hearing protection. The use of hearing protection outside of 25 feet from the Geoprobe should be incorporated under the following condition: If you have to raise your voice to talk to someone who is within 2 feet of your location, hearing protection must be worn. 4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 5) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points. - A remote sampling device must be used to sample drill cuttings near rotating tools. The equipment operator shall shutdown machinery if the sampler is near moving machinery parts. 6) Preview work locations for unstable/uneven terrain. 7) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress concerns is provided in Attachment V and Section 4 of the TtNUS Health and Safety Guidance Manual. 8) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom + 3 feet). - Secure all loose articles to avoid possible entanglement. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements. 9) Avoid nesting areas, use repellents. Report potential hazards to the SSO. Follow guidance presented in Attachment II of this HASP. 10) Suspend or terminate operations until directed otherwise by the SSO.	**It is not anticipated that potential contaminant concentrations at outdoor sample locations will present an inhalation hazard.** A direct reading Photoionization Detector (PID) with a 10.6 eV lamp or higher, or a Flameionization Detector (FID), will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring of the borehole will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions: - Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above daily-established background levels in the breathing zone areas of the at-risk employees requires site activities to be suspended and site personnel to retreat to an unaffected area. - Work may only resume if airborne readings in worker breathing zone areas return to below daily-established background levels. If elevated readings in worker breathing zone persist, the PHSO and HSM will be contacted to determine necessary actions and levels of protection. Site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be performed by observing work conditions for visible dust clouds. Potential exposure to contaminated dust will be controlled using water suppression, by avoiding dust plumes, or evacuating the operation area until dust subsides.	Level D protection will be utilized for the initiation of all sampling activities. Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Safety shoes (steel toe/shank) - Safety glasses - Surgical style gloves (double-layered if necessary) - Reflective vest for high traffic areas - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential for soiling work attire exists.* - *Hearing protection for high noise areas, or as directed on an operation by operation scenario.* *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)* **Note:** The Safe Work Permit(s) for this task (see Attachment IV) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.	**Personnel Decontamination** will consist of a removal and disposal of non-reusable PPE (gloves, coveralls, etc., as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of: - Equipment drop - Outer coveralls, boot covers, and/or outer glove removal (as applicable) - Removal, segregation, and disposal of non-reusable PPE in bags/containers provided - Soap/water wash and rinse of reusable PPE (e.g., hardhat) if potentially contaminated - Wash hands and face, leave contamination reduction zone.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR
NAVAL AIR STATION – PENSACOLA, PENSACOLA, FLORIDA

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment	Decontamination Procedures
Mobilization/ Demobilization	*Physical Hazards* 1) Lifting (strain/muscle pulls) 2) Pinches and compressions 3) Slip, trips, and falls 4) Heavy equipment hazards (rotating equipment, hydraulic lines, etc.) 5) Vehicular and foot traffic 6) Ambient temperature extremes (heat stress) *Natural hazards* 7) Insect/animal bites and stings	1) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 2) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points. 3) Preview work locations for unstable/uneven terrain. 4) All equipment will be - Inspected in accordance with OSHA, and manufacturer's design. - Operated by knowledgeable operators, and knowledgeable ground crew. 5) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom + 3 feet). - Secure all loose articles to avoid possible entanglement. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements. 6) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress concerns is provided in Section 4 of the TtNUS Health and Safety Guidance Manual. 7) Avoid nesting areas, use repellents. Report potential hazards to the SSO. Follow guidance presented in Attachment II of this HASP.	Not required	Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Safety shoes (Steel toe/shank) - *Safety glasses* - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Reflective vest for high traffic areas* - *Hearing protection for high noise areas, or as directed on an operation by operation scenario.* *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)*	Not required
Decontamination of Sampling and Heavy Equipment	*Chemical Hazards* 1) Primary types of contaminants include VOCs (primarily Aviation Gasoline [AVGAS]) and SVOCs (diesel fuel and waste oils, including general PAHs). Note that these contaminants may be bound to particulates (dusts, soils, etc.) and contact should be avoided whenever possible. None of the site contaminants, however, are anticipated to be present in significant concentrations to present an inhalation hazard. See Table 6-1 for more information on the chemicals of concern. 2) Decontamination fluids - Liquinox (detergent), acetone or isopropanol *Physical Hazards* 3) Lifting (strain/muscle pulls) 4) Noise in excess of 85 dBA 5) Flying projectiles 6) Vehicular and foot traffic 7) Ambient temperature extremes (heat stress) 8) Slips, trips, and falls *Natural Hazards* 9) Inclement weather	1) and 2) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids. Obtain manufacturer's MSDS for any decontamination fluids used onsite. These must be used in well-ventilated areas, such as outdoors. Use appropriate PPE as identified on MSDS. All chemicals used must be listed on the Chemical Inventory for the site, and site activities must be consistent with the Hazard Communication section of the Health and Safety Guidance Manual (Section 5). 3) Use multiple persons where necessary for lifting and handling sampling equipment for decontamination purposes. 4) Wear hearing protection when operating pressure washer. 5) Use eye and face protective equipment when operating pressure washer. All other personnel must be restricted from the area. 6) Traffic and equipment considerations are to include the following: - Establish safe zones of approach. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements. 7) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress concerns is provided in Attachment V and Section 4 of the TtNUS Health and Safety Guidance Manual. 8) Preview work locations for unstable/uneven terrain. 9) Suspend or terminate operations until directed otherwise by SSO.	Use visual observation, and real-time monitoring instrumentation to ensure all equipment has been properly cleaned of contamination and dried. After decon is completed, screen equipment with a PID/FID. If any elevated readings (i.e., above background) are observed, perform decon again and rescreen. Repeat until no elevated PID/FID readings are noted.	For Heavy Equipment This applies to high pressure soap/water, steam cleaning wash and rinse procedures. Level D Minimum requirements - - Standard field attire (Long sleeve shirt; long pants) - Safety shoes (Steel toe/shank) - Chemical resistant boot covers - Nitrile outer gloves - *PVC Rainsuits or PE or PVC coated Tyvek* - *Safety glasses underneath a splash shield* - *Hearing protection (plugs or muffs)* *Items in italics are at the discretion of the SSO.* For sampling equipment (trowels, MacroCore Samplers, bailers, etc.), the following PPE is required Note: Consult MSDS for PPE guidance. Otherwise, observe the following. Level D Minimum requirements - - Standard field attire (Long sleeve shirt; long pants) - Safety shoes (Steel toe/shank) - Nitrile outer gloves - Safety glasses In the event of overspray of chemical decontamination fluids employ PVC Rainsuits or PE or PVC coated Tyvek as necessary.	**Personnel Decontamination** will consist of a soap/water wash and rinse for reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of: - Equipment drop - Soap/water wash and rinse of outer boots and gloves, as applicable - Soap/water wash and rinse of the outer splash suit, as applicable - Disposable PPE will be removed and bagged. **Equipment Decontamination** - All heavy equipment decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers. Heavy equipment will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. All site vehicles will have restricted access to exclusion zones, and have their wheels/tires sprayed off as not to track mud onto the roadways servicing this installation. Roadways shall be cleared of any debris resulting from the onsite activity. **Sampling Equipment Decontamination** Sampling equipment will be decontaminated as per the requirements in the Sampling and Analysis Plan and/or Work Plan. MSDS for any decon solutions (Alconox, isopropanol, etc.) will be obtained and used to determine proper handling / disposal methods and protective measures (PPE, first-aid, etc.). All equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site. The FOL or the SSO will be responsible for evaluating equipment arriving onsite and leaving the site. No equipment will be authorized access or exit without this evaluation.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR
NAVAL AIR STATION – PENSACOLA, PENSACOLA, FLORIDA

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment	Decontamination Procedures
IDW management and moving IDW drums to storage areas	*Chemical Hazards* 1) Primary types of contaminants include VOCs (primarily Aviation Gasoline [AVGAS]) and SVOCs (diesel fuel and waste oils, including general PAHs). Note that these contaminants may be bound to particulates (dusts, soils, etc.) and contact should be avoided whenever possible. None of the site contaminants, however, are anticipated to be present in significant concentrations to present an inhalation hazard. See Table 6-1 for more information on the chemicals of concern. 2) Transfer of contamination into clean areas *Physical hazards* 3) Noise in excess of 85 dBA 4) Lifting (strain/muscle pulls) 5) Pinches and compressions 6) Slip, trips, and falls 7) Vehicular and foot traffic 8) Ambient temperature extremes (heat stress) *Natural hazards* 9) Insect/animal bites and stings	1) Employ real-time monitoring instrumentation, action levels, and identify PPE to control exposures to potentially contaminated media (e.g. air, water, soils). 2) Decontaminate all equipment and supplies, if they become contaminated, between locations and prior to leaving the site. 3) When working near heavy equipment, use hearing protection. 4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 5) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points. 6) Preview work locations for unstable/uneven terrain. 7) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom + 3 feet). - Secure all loose articles to avoid possible entanglement. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements. 8) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress concerns is provided in Section 4 of the TtNUS Health and Safety Guidance Manual. 9) Avoid nesting areas, use repellents. Report potential hazards to the SSO. Follow guidance presented in Attachment II of this HASP.	**It is not anticipated that potential contaminant concentrations at outdoor sample locations will present an inhalation hazard.** A direct reading Photoionization Detector (PID) with a 10.6 eV lamp or higher, or a Flameionization Detector (FID), will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring of the borehole will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions: - Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above daily-established background levels in the breathing zone areas of the at-risk employees requires site activities to be suspended and site personnel to retreat to an unaffected area. - Work may only resume if airborne readings in worker breathing zone areas return to below daily-established background levels. If elevated readings in worker breathing zone persist, the PHSO and HSM will be contacted to determine necessary actions and levels of protection. Site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be performed by observing work conditions for visible dust clouds. Potential exposure to contaminated dust will be controlled using water suppression, by avoiding dust plumes, or evacuating the operation area until dust subsides.	Level D protection will be utilized for the initiation of all sampling activities. Level D - (Minimum Requirements) - Standard field attire (long sleeve shirt; long pants) - Nitrile or cotton/leather work gloves with surgical style inner gloves - Safety shoes (steel toe/shank) - Safety glasses - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Reflective vest for high traffic areas* - *Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential for soiling work attire exists.* - *Hearing protection for high noise areas, or as directed on an operation by operation scenario.* *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)*	**Personnel Decontamination** will consist of a soap/water wash and rinse for reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of: - Equipment drop - Soap/water wash and rinse of outer boots and gloves, as applicable - Soap/water wash and rinse of the outer splash suit, as applicable - Disposable PPE will be removed and bagged.

6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical, physical, and natural hazards anticipated to be present during the activities to be conducted. Table 6-1 provides information related to chemical constituents that have been identified by analysis or are suspected to be present at the site based on historical data. Specifically, toxicological information, exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data are discussed in the table.

6.1 CHEMICAL HAZARDS

The potential health hazards associated with the Fuel Farm include inhalation, ingestion, and dermal contact of various contaminants that may be present in shallow and deep soils and groundwater. As the focus of this contamination assessment is to conduct additional sampling of various media at the site, concentrations of the chemical hazards potentially present are not fully determined. Based on prior activities at the site and limited prior sampling; however, the types of contaminants anticipated include AVGAS, diesel fuel, and waste oil products. The following have been identified as the primary classes of hazards for these contaminants:

- Volatile Organic Compounds (VOCs), primarily Aviation Gasoline (AVGAS)
- Semi-Volatile Organic Compounds (SVOCs), primarily diesel fuel and waste oils, including general Polynuclear Aromatic Hydrocarbons (PAHs).

Table 6-1 provides information on the individual substances likely to be present at the sites of concern. Included is information on the toxicological, chemical, and physical properties of these substances. It is anticipated that the greatest potential for exposure to site contaminants is during intrusive activities (drilling, soil sampling, etc.). Exposure to these compounds is most likely to occur through ingestion and inhalation of contaminated soil or water, or hand-to-mouth contact during soil disturbance activities. For this reason, PPE and basic hygiene practices (washing face and hands before leaving site) will be extremely important. Inhalation exposure will be avoided by using appropriate PPE and engineering controls where necessary.

6.2 PHYSICAL HAZARDS

The physical hazards that may be present during the performance of site activities are summarized below:

- Heavy equipment hazards (pinch/compression points, rotating equipment, etc.).
- Slips, trips, and falls

- Energized systems (contact with underground or overhead utilities)
- Lifting (strain/muscle pulls)
- Noise in excess of 85 decibels (dBA)
- Inclement weather
- Flying projectiles
- Ambient temperature extremes (heat stress)
- Pinches and compressions
- Vehicular and foot traffic

These physical hazards are discussed in Table 5-1 as applicable to each site task. Further, many of these hazard are discussed in detail in Section 4.0 of the Health and Safety Guidance Manual. Specific discussions on some of these hazards are presented below.

6.2.1 Heavy Equipment Hazards (Pinch/compression points, rotating equipment, etc.)

Often the hazards associated with drilling operations are the most dangerous to be encountered during site activities. The SSO will thoroughly discuss safe drilling procedures during the pre-activities training session. All site personnel will sign the form in Figure 8-2 documenting that they received the training and understand the procedures. The following rules will apply to all drilling operations:

- Each rig must be equipped with emergency stop devices which will be tested daily to ensure that they are operational.
- Long handled shovels or equivalent shall be used to clear cuttings from the borehole and rotating equipment.
- The driller may not leave the controls when the augers are rotating.

6.2.2 Energized Systems (Contact with Underground or Overhead Utilities)

Underground utilities such as pressurized lines, water lines, telephone lines, buried utility lines, and high voltage power lines are known to be present throughout the facility. Clearance of underground and overhead utilities for each sample location will be coordinated with NAS Pensacola personnel. Ron Joyner is the point-of-contact for utilities clearance and can be reached at (850) 452-4611. Additionally, drilling operations will be conducted at a safe distance (>20 feet) from overhead power lines. Whenever underground utilities are suspected to be close to subsurface sampling locations, the borehole will be advanced to a minimum of five (5) feet with a hand auger prior to drilling. As built drawings may also be utilized for additional clarification. In certain cases, Base personnel may need to de-energize electrical cables using facility lockout/tagout procedures to insure electrical hazards are eliminated.

6.2.3 Ambient Temperature Extremes

Overexposure to high ambient temperatures (heat stress) may exist during performance of this work depending on the project schedule. Extremely cold temperatures are not expected to be encountered due to project location. Work performed when ambient temperatures exceed 70°F may result in varying levels of heat stress (heat rash, heat cramps, heat exhaustion, and/or heat stroke) depending on variables such as wind speed, humidity, and percent sunshine, as well as physiological factors such as metabolic rate and skin moisture content. Additionally, work load and level of protective equipment will affect the degree of exposure. Site personnel will be encouraged to drink plenty of fluids to replace those lost through perspiration. Additional information such as Work-Rest Regimens and personnel monitoring may be found in Attachment V and Section 4.0 of the Guidance Manual. The SSO will recommend additional heat stress control measures as they are deemed necessary as per ACGIH guidelines.

6.3 NATURAL HAZARDS

Insect/animal bites and stings, poisonous plants, and inclement weather are natural hazards that may be present given the location of activities to be conducted. In general, avoidance of areas of known infestation or growth will be the preferred exposure control for insects/animals and poisonous plants. Specific discussion on principle hazards of concern follows:

6.3.1 Insect/animal Bites and Stings

Various insects and animals may be present and should be considered. For example, fire ants present a unique situation when working outdoors in Florida. Their aggressive behavior and their ability to sting repeatedly can pose a unique health threat. The sting injects venom that causes an extreme burning sensation. Pustules form which can become infected if scratched. Allergic reactions of people sensitive to the venom include dizziness, swelling, shock and in extreme cases unconsciousness and death. People exhibiting such symptoms should see a physician. Fire ants can be identified by their habitat. They build mounds in open sunny areas sometimes supported by a wall or shrub. The mound has no external opening. The size of the mound can range from a few inches across to some which are in excess of two feet or more in height and diameter. When disturbed they defend it by swarming out and over the mound, even running up grass blades and sticks.

Also, areas to be investigated could be prime nesting and/or hiding locations for snakes and other insects.. Personnel should avoid reaching into areas that are not visibly clear of snakes or insects. Snake chaps will be worn in areas of known or anticipated snake infestation. All site personnel who are allergic to stinging insects such as bees, wasps, and hornets must be particularly careful since severe illness and death may result from allergic reactions. As with any medical condition or allergy, information regarding the condition must be listed on the Medical Data Sheet and the FOL and SSO notified.

There are various areas throughout the U.S. where Lyme Disease is endemic. Fortunately, Florida is not one of these areas. Nonetheless, personnel should be aware of the hazards of tick bites and Lyme Disease. The longer a disease carrying tick remains attached to the body, the greater the potential for contracting the disease. Wearing long sleeved shirts and long pants (tucked into boots). As well as performing frequent body checks will prevent long term attachment. Site first aid kits should be equipped with medical forceps and rubbing alcohol to assist in tick removal. For information regarding tick removal procedures, and symptoms of exposure consult Attachment II of this HASP or Section 4.0 of the Health and Safety Guidance Manual.

An Office of Natural Resources or similar entity on Base should be contacted for further direction on the hazards and precautions of naturally occurring wildlife and insects.

6.3.2 Inclement Weather

Project tasks under this Scope of Work will be performed outdoors and near water. As a result, inclement weather may be encountered. In the event that adverse weather conditions arise (electrical storms, hurricanes, etc.), the FOL and/or the SSO will be responsible for temporarily suspending or terminating activities until hazardous conditions no longer exist.

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Diesel Fuel No.2-D	Mixture	Components of this substance will be detected readily; however, no documentation exists as to the relative response ratio of either PID or FID.	Air sampling use charcoal tube as a collection media; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with NIOSH Method #1550.	OSHA; NIOSH; ACGIH: 5 mg/m^3 as mineral oil mist. In addition NIOSH and ACGIH establish 10 mg/m^3 as a STEL.	Kerosene odor **Recommended air-purifying cartridges:** Organic vapor **Recommended gloves:** Nitrile	**Boiling Pt:** <300-550°F; 149-288°C **Melting Pt:** Not available **Solubility:** Negligible **Flash Pt:** 95-145°F; 35-62°C **Autoignition:** 475°F, 246°C **LEL/LFL:** 0.6% **UEL/UFL:** 8.0% **Vapor Density:** >5 **Vapor Pressure:** <0.1 mmHg @ 70°F; 21°C **Specific Gravity:** 0.80 **Incompatibilities:** strong oxidizers, halogens, and hypochlorites **Appearance and odor:** Colorless to amber with a kerosene odor	Prolonged or repeated exposures to this product may cause skin and eye irritation. Because of the defatting capabilities ,this exposure may lead to a dermatitis condition. High vapor concentrations are irritating to the eyes and respiratory tract. Exposure to high airborne concentrations may result in narcotic effects, including dizziness, headaches, and anesthetic to unconsciousness. High concentrations in a confined space may adequately displace oxygen thereby resulting in suffocation.
Waste Oils All information is based on mineral oil	Mixture N.E. 8012-95-1 for mineral oil	Varies between fractions however waste oils tend to be less volatile. The FID tends to handle the longer chained aliphatic hydrocarbons more efficiently than its PID counterpart and would be selected as the instrument of choice.	Sampling and analytical protocol shall be in accordance with NIOSH Method #5026 (the recommended method for mineral oil mist).	ACGIH; NIOSH: 5 mg/m^3 (oil mists); 10 mg/m^3 STEL. OSHA; 5 mg/m^3 (Oil mists)	Non-volatile substance, therefore no respiratory protection is required. In an aerosol form, dust and mist respirator would be considered acceptable for up to 500 mg/m^3 . Recommended gloves: Any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances, and will be acceptable). Natural rubber gloves should be avoided. Recommended gloves: Nitrile	**Boiling Pt:** 680°F; 360°C **Melting Pt:** Not available **Solubility:** Insoluble **Flash Pt:** 275-500°F; 135-260°C depends on the distillation fraction **LEL/LFL:** Not available **UEL/UFL:** Not available **Vapor Density:** Not available **Vapor Pressure:** <0.5 mmHg **Specific Gravity:** 0.90 **Incompatibilities:** None reported **Appearance and odor:** Colorless, oily, with an odor of burned lubricating oil.	Minor irritation to the eyes, skin, and respiratory system.
Aviation Gasoline (AVGAS or gasoline)	8006-61-9	Relative response ratios for the components of gasoline range from 100 - 200% for PID and FID detection.	See components for measurement considerations.	ACGIH & OSHA: 300 ppm 500 ppm STEL NIOSH: Reduce to lowest feasible concentration.	**Respiratory Protection:** Odor threshold 0.7 ppm, adequate air purifying respirator with organic vapor cartridges up to 100 ppm. **Recommended Gloves:** Nitrile >6.00 hrs; PV alcohol >6.00 hrs; Viton/neoprene >8.00 hrs	**Boiling Pt:** 102°F; 39°C **Melting Pt:** Not available **Solubility:** Negligible **Flash Pt:** -50°F; -45°C **LEL/LFL:** 1.4% **UEL/UFL:** 7.6% **Vapor Density:** ~5 **Vapor Pressure:** 38-300 mmHg (varies seasonally) **Specific Gravity:** 0.74 @ 20/20°C **Incompatibilities:** Strong oxidizers, peroxides, strong acids, and perchlorates **Appearance and Odor:** Colorless liquid with gasoline odor.	Overexposure to this substance may result in irritation to the eyes, skin, and mucous membranes. Systemically, headache, fatigue, blurred vision, dizziness, slurred speech, confusion, possible convulsion, and chemical pneumonia (aspiration). Prolonged or chronic exposures may result in possible liver or kidney damage. Components of this substance have been determined to be confirmed human carcinogens.

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL AIR STATION PENSACOLA, PENSACOLA, FLORIDA
PAGE 2

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
General PAHs / Coal Tar Pitch Volatiles / Creosote / cresol (Fluoranthene, pyrene, benzo(a) anthracene, benzo(a) pyrene, benzo(f)fluoranthene, benzo(k)fluoranthene), etc.)	(CAS Numbers vary depending on specific compound)	PID: I.P. of 8.97 eV, relative response ratio unknown. FID: Response factor unknown but given the substances flammability, detection by FID can be anticipated.	Refer to NIOSH methods for each specfic compound for appropriate air sampilng protocols. Many PAHs can be sampled using NIOSH Method 5506 or 5515 - Teflon filter with support ring - High pressure liquid chromatography with UV detector. For cresol (a major constituent of creosote) by silica gel or xad-7 sorbent tube; Acetone desorption and analysis by gas chromatography - flame ionization detector or high-pressure liquid chromatography. (NIOSH Method #2001, or OSHA Method #32)	**General PAHs**: Most PAHs have no established exposure limits. Other Coal Tar Pitch Volatiles / PAHs such as chrysene and benzo(a)pyrene have an exposure limit of 0.2 mg/m^3 (OSHA and ACGIH). 0.1 mg/m^3 - (NIOSH) **Creosote / Cresol:** OSHA; ACGIH: 5 ppm NIOSH: 2.3 ppm IDLH: 80 mg/m^3	Adequate - use a full-face air-purifying respirator with organic vapor / dust/mist cartridge up to 250 ppm. Cresol has an Odor Threshold of 0.00005-0.0079 ppm. **Recommended gloves:** Viton >96.00 hrs; butyl rubber >90.00 hrs; neoprene >4.50 hrs	Properties of various PAHs/Coal Tar Pitch Volatiles vary depending upon the specific compound. *For Creosote/Cresol:* **Boiling Pt:** 376-397°F; 191-203°C **Melting Pt:** 52-96°F; 10.9-35.5°C **Solubility:** Insoluble **Flash Pt:** 178°F; 81°C **LEL/LFL:** Not available **UEL/UFL:** Not available **Vapor Density:** 3.72 **Vapor Pressure:** 1 mmHg @ 100-127° F; 38-53°C **Specific Gravity:** 1.030-1.038 **Incompatibilities:** Nitric acid, oleum, chlorosulfonic acid, oxidizers **Appearance and Odor:** Yellowish or colorless, flammable, oily liquid (often brownish because of impurities or oxidation)	Regulated based on effects on respiratory tract and skin irritation Other effects may include eye irritiation and central nervous system, distrubances. Acute exposures may result in difficulty breathing, respiratory failure and skin and eye irritation and bums. Chronic exposure may damage the liver, kidneys, lungs and skin and cause photosensitivity. IARC, NTP, NIOSH, ACGIH, and the EPA list some PAHs such as benzo(a)pyrene as a potential carcinogen (ARC 2A, NTP-2, ACGIH TLV-A2, NIOSH-X, EPA-B2).

7.0 AIR MONITORING

Direct reading instruments will be used at the site to detect and evaluate the presence of site contaminants and other potentially hazardous conditions. As a result, specific air monitoring measures and requirements are established in Table 5-1 pertaining to the specific hazards and tasks of an identified operation. Additionally, the Health and Safety Guidance Manual, Section 1.0, contains detailed information regarding direct reading instrumentation, as well as general calibration procedures of various instruments.

7.1 INSTRUMENTS AND USE

Instruments will be used primarily to monitor source points and worker breathing zone areas, while observing instrument action levels. Action levels are discussed in Table 5-1 as they may apply to a specific task or location.

7.1.1 Photoionization Detector or Flame Ionization Detector

In order to accurately monitor for any substances which may present an exposure potential to site personnel, a Photoionization Detector (PID) using a lamp energy of 10.6 eV or higher will be used. This instrument will be used to monitor potential source areas and to screen the breathing zones of employees during site activities. The PID has been selected because it is capable of detecting the organic vapors of concern (NOTE: A Flame Ionization Detector [FID] may be used as an alternative to the PID).

Prior to the commencement of any field activities, the background levels of the site must be determined and noted. Daily background readings will be taken away from any areas of potential contamination. These readings, any influencing conditions (i.e., weather, temperature, humidity) and site location must be documented in the field operations logbook or other site documentation (e.g., sample log sheet).

7.1.2 Hazard Monitoring Frequency

Table 5-1 presents the frequencies that hazard monitoring will be performed as well as the action levels which will initiate the use of elevated levels of protection. The SSO may decide to increases these frequencies based on instrument responses and site observations. The frequency at which monitoring is performed will not be reduced without the prior consent of the PHSO or HSM.

7.2 INSTRUMENT MAINTENANCE AND CALIBRATION

Hazard monitoring instruments will be maintained and pre-field calibrated by the TtNUS Equipment Manager. Operational checks and field calibration will be performed on all instruments each day prior to their use. Field calibration will be performed on instruments according to manufacturer's recommendations (for example, the PID must be field calibrated daily and an additional field calibration must be performed at the end of each day to determine any significant instrument drift). These operational checks and calibration efforts will be performed in a manner that complies with the employees health and safety training, the manufacturer's recommendations, and with the applicable manufacturer standard operating procedure (copies of which can be found in the Health & Safety Guidance Manual which will be maintained on site for reference). All calibration efforts must be documented. Figure 7-1 is provided for documenting these calibration efforts. This information may instead be recorded in a field operations logbook, provided that all of the information specified in Figure 7-1 is recorded. This required information includes the following:

- Date calibration was performed
- Individual calibrating the instrument
- Instrument name, model, and serial number
- Any relevant instrument settings and resultant readings (before and after) calibration
- Identification of the calibration standard (lot no., source concentration, supplier)

Any relevant comments or remarks

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: ______________________________ PROJECT NO.:__________

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

This section is included to specify health and safety training and medical surveillance requirements for both TtNUS and subcontractor personnel participating in site activities.

8.1.1 Requirements for TtNUS Personnel

All TtNUS personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at the NAS Pensacola facility. Additionally, TtNUS personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training in the past 12 months before being cleared for site work. In addition, 8-hour supervisory training in accordance with 29 CFR 1910.120 (e)(4) will be required for site supervisory personnel.

Documentation of TtNUS introductory, supervisory, and refresher training as well as site-specific training will be maintained at the project. Copies of certificates or other official documentation will be used to fulfill this requirement.

8.1.2 Requirements for Subcontractors

All TtNUS subcontractor personnel must have completed introductory hazardous waste site training or equivalent work experience as defined in OSHA Standard 29 CFR 1910.120 (e). Additionally, personnel who have had the introductory training more than 12 months ago, are required to have 8 hours of refresher training meeting the requirements of 29 CFR 1910.120 (e)(8) prior to performing field work at the NAS Pensacola facility if required. TtNUS subcontractors must certify that each employee has had such training by sending TtNUS a letter, on company letterhead, containing the information in the example letter provided as in Figure 8-1 and by providing copies of certificates for all subcontractor personnel participating in site activities.

FIGURE 8-1
TRAINING LETTER

The following statements must be typed on company letterhead and signed by an officer of the company and accompanied by copies of personnel training certificates:

LOGO
XYZ CORPORATION
555 E. 5th Street
Nowheresville, Kansas 55555

Month, day, year

Mr. Terry Hansen
Tetra Tech NUS, Inc.
Task Order Manager
Ellis Building, Suite 220
1311 Executive Center Drive
Tallahassee, Florida, 32301

Subject: HAZWOPER Training for NAS Pensacola, Pensacola, Florida

Dear Mr. Hansen:

As an officer of XYZ Corporation, I hereby state that I am aware of the potential hazardous nature of the subject project. I also understand that it is our responsibility to comply with all applicable occupational safety and health regulations, including those stipulated in Title 29 of the Code of Federal Regulations (CFR), Parts 1900 through 1910 and Part 1926.

I also understand that Title 29 CFR 1910.120, entitled "Hazardous Waste Operations and Emergency Response," requires appropriate level of training for certain employees engaged in hazardous waste operations. In this regard, I hereby state that the following employees have had 40 hours of introductory hazardous waste site training or equivalent work experience as requested by 29 CFR 1910.120(e) and have had 8 hour of refresher training as applicable and as required by 29 CFR 1910.120(e)(8) and that site supervisory personnel have had training in accordance with 29 CFR 1910.120(e)(4).

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

Should you have any questions, please contact me at (555) 555-5555

Sincerely,

(Name and Title of Company Officer)

Enclosed: Training Certificates

8.2 SITE-SPECIFIC TRAINING

TtNUS will provide site-specific training to all TtNUS employees and subcontractor personnel who will perform work on this project. Site-specific training will also be provided to all personnel (U.S. Department of Defense, EPA, etc.) who may enter the site to perform functions that may or may not be directly related to site operations. Site-Specific training will include:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Incipient response procedures
- Review of the contents of relevant Material Safety Data Sheets

Site-specific documentation will be established through the use of Figure 8-2. All site personnel and visitors must sign this document upon receiving site-specific training.

8.3 MEDICAL SURVEILLANCE

8.3.1 <u>Medical Surveillance Requirements for TtNUS Personnel</u>

All TtNUS personnel participating in project field activities will have had a physical examination meeting the requirements of TtNUS's medical surveillance program and will be medically qualified to perform hazardous waste site work using respiratory protection.

Documentation for medical clearances will be maintained in the TtNUS Jacksonville office and made available, as necessary.

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing remedial investigation activities at NAS Pensacola, Pensacola, Florida and that I have received site-specific training which included the elements presented below:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Incipient response procedures
- Review of the contents of relevant Material Safety Data Sheets

My signature below indicates that I have been given the opportunity to ask questions and that all of my questions have been answered to my satisfaction, and that the dates of my training and medical surveillance indicated below are accurate.

Name (Printed and Signature)	**Site-Specific Training Date**	**40-Hour Training (Date)**	**8-Hour Refresher Training (Date)**	**8-Hour Supervisory Training (Date)**	**Medical Exam**

8.3.2 Medical Surveillance Requirements for Subcontractors

Subcontractors are required to obtain a certificate of their ability to perform hazardous waste site work and to wear respiratory protection. The "Subcontractor Medical Approval Form" provided in Figure 8-3 shall be used to satisfy this requirement, providing it is properly completed and signed by a licensed physician.

Subcontractors who have a company medical surveillance program meeting the requirements of paragraph (f) of OSHA 29 CFR 1910.120 can substitute "Subcontractor Medical Approval Form" (See Figure 8-3) with a letter, on company letterhead, containing all of the information in the example letter presented in Figure 8-4 of this HASP.

8.3.3 Requirements for All Field Personnel

Each field team member (including subcontractors) and visitors entering the exclusion zone(s) shall be required to complete and submit a copy of Medical Data Sheet found in the TtNUS Health and Safety Guidance Manual. This shall be provided to the SSO, prior to participating in site activities. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

8.4 SUBCONTRACTOR EXCEPTIONS

Subcontractors who will not enter the exclusion zone during intrusive operations, and whose activities involve no potential for exposure to site contaminants, will not be required to meet the requirements for training/medical surveillance other than those stated for site-specific training (See Section 8.2).

FIGURE 8-3

SUBCONTRACTOR MEDICAL APPROVAL FORM

For employees of ____
Company Name

Participant Name: ____________________________ Date of Exam: ________________

Part A

The above-named individual has:

1. Undergone a physical examination in accordance with OSHA Standard 29 CFR 1910.120, paragraph (f) and found to be medically -

   ( ) qualified to perform work at the NAS Pensacola, work site
   ( ) not qualified to perform work at the NAS Pensacola, work site

and,

2. Undergone a physical examination as per OSHA 29 CFR 1910.134(b)(10) and found to be medically -

   ( ) qualified to wear respiratory protection
   ( ) not qualified to wear respiratory protection

My evaluation has been based on the following information, as provided to me by the employer.

( ) A copy of OSHA Standard 29 CFR 1910.120 and appendices.
( ) A description of the employee's duties as they relate to the employee's exposures.
( ) A list of known/suspected contaminants and their concentrations (if known).
( ) A description of any personal protective equipment used or to be used.
( ) Information from previous medical examinations of the employee which is not readily available to the examining physician.

Part B

I, ______________________________, have examined ________________________________
Physician's Name (print) Participant's Name (print)
and have determined the following information:

FIGURE 8-3
SUBCONTRACTOR MEDICAL APPROVAL FORM
PAGE TWO

1. Results of the medical examination and tests (excluding finding or diagnoses unrelated to occupational exposure):

   ____
   ____
   ____

2. Any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health:

   ____
   ____
   ____

3. Recommended limitations upon the employee's assigned work:

   ____
   ____
   ____

I have informed this participant of the results of this medical examination and any medical conditions which require further examination of treatment.

Based on the information provided to me, and in view of the activities and hazard potentials involved at the NAS Pensacola work site, this participant

( ) may
( ) may not

perform his/her assigned task.

Physician's Signature ____________________

Address ____________________

Phone Number ____________________

NOTE: Copies of test results are maintained and available at:

____
Address

FIGURE 8-4

MEDICAL SURVEILLANCE LETTER

The following statements must be typed on company letterhead and signed by an officer of the company:

LOGO
XYZ CORPORATION
555 E. 5th Street
Nowheresville, Kansas 55555

Month, day, year

Mr. Terry Hansen
Tetra Tech NUS, Inc.
Task Order Manager
Ellis Building, Suite 220
1311 Executive Center Drive
Tallahassee, Florida, 32301

Subject: HAZWOPER Training for NAS Pensacola, Pensacola, Florida

Dear Mr. Hansen:

As an officer of XYZ Corporation, I hereby state that the persons listed below participate in a medical surveillance program meeting the requirements contained in paragraph (f) of Title 29 of the Code of Federal Regulations (CFR) Part 1910.120, entitled "Hazardous Waste Operations and Emergency Response. I further state that the persons listed below have had physical examinations under this program within the past 12 months and that they have been cleared, by a license physician, to perform hazardous waste site work and to wear positive- and negative-pressure respiratory protection. I also state that, to my knowledge, no person listed below has any medical restriction that would preclude him/her from working at the NAS Pensacola facility.

LIST OF FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

Should you have any questions, please contact me at (555) 555-5555

Sincerely,

(Name and Title of Company Officer)

9.0 SITE CONTROL

This section outlines the means by which TtNUS will delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three-zone approach will be used during work at this site: exclusion zone, contamination reduction zone, and support zone. It is also anticipated that this control measure will be used to control access to site work areas. Use of such controls will restrict the general public, minimize potentials for the spread of contaminants and to protect individuals who are not cleared to enter the work areas.

9.1 EXCLUSION ZONE

The exclusion zone will be considered those areas of the site of known or suspected contamination. It is not anticipated that significant amounts of surface contamination are in the proposed work areas of this site. It is anticipated that this will remain so until/unless contaminants are brought to the surface by intrusive activities such as drilling. Furthermore, once such activities have been completed and surface contamination has been removed, the potential for exposure is again diminished and the area can then be reclassified as part of the contamination reduction zone. Therefore, the exclusion zones for this project will be limited to those areas if the site where active work is being performed plus so many feet surrounding the point of operation (See Table 5-1 for specific operation). The exclusion zone for this activity will represent the areas where the soils are disturbed through soil gas surveying and sampling activities. All exclusion zones will be delineated (barrier tape, cones and/or postings) to inform and direct facility personnel.

9.1.1 Exclusion Zone Clearance

A pre-startup site visit will be conducted by members of the field team in an effort to identify proposed subsurface investigation locations, conduct utility clearances, and provide up-front notices concerning scheduled activities within the facility. In all cases, no subsurface activities will proceed without utility clearance. In the event that a utility is struck during a subsurface investigative activity, the emergency numbers provided in Table 2-1, will be notified.

When base personnel are working within the proximity of this investigation, they will be moved or their operation temporarily discontinued to remove them from potential hazards associated with this operation.

9.2 CONTAMINATION REDUCTION ZONE

The contamination reduction zone (CRZ) will be a buffer area between the exclusion zone and any area of the site where contamination is not suspected. This area will also serve as a focal point in supporting exclusion zone activities. This area will be delineated using barrier tape, cones, and postings to inform and direct facility personnel. Decontamination will be conducted at a central location. All equipment potentially contaminated will be bagged and taken to that location for decontamination.

9.3 SUPPORT ZONE

The support zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. In all cases, the support zones will be established at areas of the site where exposure to site contaminants would not be expected during normal working conditions or foreseeable emergencies.

9.4 SAFE WORK PERMITS

All exclusion zone work conducted in support of this project will be performed using Safe Work Permits to guide and direct field crews on a task by task basis. An example of the Safe Work Permit to be used is illustrated in Figure 9-1. Partially completed Permits for the work to be performed are included in Attachment I. The daily meetings conducted at the site will further support these work permits. This effort will ensure all site-specific considerations and changing conditions are incorporated into the planning effort. All permits will require the signature of the FOL and SSO.

Use of these permits will provide the communication line for reviewing protective measures and hazards associated with each operation. This HASP will be used as the primary reference for selecting levels of protection and control measures. The work permit will take precedence over the HASP when more conservative measures are required based on specific site conditions.

FIGURE 9-1
SAFE WORK PERMIT

Permit No. ______________ Date: __________________ Time: From ____________ to _____________

SECTION I: General Job Scope (To be filled in by person performing work)

I. Work limited to the following (description, area, equipment used): ______________________

II. Names: ______________________

III. Onsite Inspection conducted ☐ Yes ☐ No Initials of Inspector ____________ TtNUS ____________ NAS Pensacola

SECTION II: General Safety Requirements (To be filled in by permit issuer)

IV. Protective equipment required

Level D ☐ Level B ☐
Level C ☐ Level A ☐
Detailed on Reverse

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
SKA-PAC SAR	☐	Bottle Trailer	☐
Skid Rig	☐	None	☐

Modifications/Exceptions: ______________________

V. Chemicals of Concern	Action Level(s)	Response Measures

VI. Additional Safety Equipment/Procedures

Hardhat	☐ Yes	☐ No
Safety Glasses	☐ Yes	☐ No
Chemical/splash goggles	☐ Yes	☐ No
Splash Shield	☐ Yes	☐ No
Splash suits/coveralls	☐ Yes	☐ No
Steel toe/shank Workboots	☐ Yes	☐ No
Hearing Protection (Plugs/Muffs)	☐ Yes	☐ No
Safety belt/harness	☐ Yes	☐ No
Radio	☐ Yes	☐ No
Barricades	☐ Yes	☐ No
Gloves (Type)	☐ Yes	☐ No
Work/rest regimen	☐ Yes	☐ No

Modifications/Exceptions: ______________________

VII. Procedure review with permit acceptors

	Yes	NA
Safety shower/eyewash (Location & Use)	☐	☐
Procedure for safe job completion	☐	☐
Contractor tools/equipment inspected	☐	☐
Emergency alarms	☐	☐
Evacuation routes	☐	☐
Assembly points	☐	☐

VIII. Equipment Preparation

	Yes	NA
Equipment drained/depressured	☐	☐
Equipment purged/cleaned	☐	☐
Isolation checklist completed	☐	☐
Electrical lockout required/field switch tested	☐	☐
Blinds/misalignments/blocks & bleeds in place	☐	☐
Hazardous materials on walls/behind liners considered	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☐ Yes ☐ No
If yes, fill out appropriate section(s) on safety work permit addendum

X. Special instructions, precautions: ______________________

Permit Issued by: ____________________ Permit Accepted by: ____________________
Job Completed by: ____________________ Date: ____________________

9.5 SITE VISITORS

Site visitors for the purpose of this document are identified as representing the following groups of individuals:

- Personnel invited to observe or participate in operations by TtNUS
- Regulatory personnel (DOD,FDEP, OSHA, etc.)
- Southern Division Navy Personnel
- Other authorized visitors

It is not anticipated that this operation will result in a large number of site visitors. However, as some visitors can reasonably be expected, the following requirements will be enforced:

- All site visitors will be routed to the FOL, who will sign them in to the field logbook. Information to be recorded in the logbook will include the individual's name (proper identification required), who they represent, and purpose for the visit.

- All site visitors will be required to produce the necessary information supporting clearance onto the site. This includes information attesting to applicable training (40-hours of HAZWOPER training required for all Southern Division Navy personnel) and medical surveillance, as stipulated in Section 8 of this document. In addition, to enter the site's operational zones during planned activities, all visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this document.

NOTE: All site visitors will be escorted at all times while at the site.

Following this, the site visitor will be permitted to enter the site and applicable operational areas. All visitors are required to observe the protective equipment and site restrictions in effect at the area of their visit. Any and all visitors not meeting the requirements as stipulated in this plan for site clearance will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause all onsite activities to be terminated until that visitor can be removed. Removal of unauthorized visitors will be accomplished with support from the Base Contact, if necessary. At a minimum, the Navy Environmental Coordinator will be notified of any unauthorized visitors.

9.6 SITE SECURITY

Site security will be accomplished using TtNUS field personnel. TtNUS will retain complete control over active operational areas. As this activity takes place at Navy facilities open to public access, and along public highways, the first line of security will take place using traffic permit restrictions, exclusion zone barriers, and any existing barriers at the sites to restrict the general public. The second line of security will take place at the work site referring interested parties to the FOL or designee. The FOL will serve as a focal point for all non-project interested parties, and serve as the final line of security and the primary enforcement contact.

9.7 SITE MAP

Once the areas of contamination, access routes, topography, and dispersion routes are determined, a site map will be generated and adjusted as site conditions change. When possible, these maps will be posted to illustrate up-to-date collection of contaminants and adjustment of zones and access points.

9.8 BUDDY SYSTEM

Personnel engaged in on site activities will practice the "buddy system" to ensure the safety of all personnel involved in this operation.

9.9 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

TtNUS and subcontractor personnel will provide MSDSs for all chemicals brought on site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application of the substances on site. A chemical inventory of all chemicals used on site will be developed using the Health and Safety Guidance Manual. The MSDSs will then be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request.

9.10 COMMUNICATION

As personnel will be working in proximity to one another during field activities, a supported means of communication between field crews members will not be necessary. External communication will be accomplished by using the telephones at predetermined and approved locations. External communication will primarily be used for the purpose of resource and emergency resource communications. Prior to the commencement of activities, the FOL will determine and arrange for telephone communications.

10.0 SPILL CONTAINMENT PROGRAM

10.1 SCOPE AND APPLICATION

It is not anticipated that bulk hazardous materials (over 55-gallons) will be handled at any given time as part of this scope of work. It is also not anticipated that such spillage would constitute a danger to human health or the environment. However, as the job progresses, the potential may exist for accumulating Investigative Derived Wastes (IDW) such as decontamination fluids, soil cuttings, and purge and well development waters, in a central staging area. Once these fluids and other materials have been characterized, they can be removed from this area and properly disposed.

10.2 POTENTIAL SPILL AREAS

Potential spill areas will be periodically monitored in an ongoing attempt to prevent and control further potential contamination of the environment. Currently, limited areas are vulnerable to this hazard including:

- Resource deployment
- Waste transfer
- Central staging

It is anticipated that all IDW generated as a result of this scope of work will be containerized, labeled, and staged to await further analyses. The results of these analyses will determine the method of disposal.

10.3 LEAK AND SPILL DETECTION

To establish an early detection of potential spills or leaks, a periodic walk-around by the personnel staging or disposing of drums or in the resource deployment area will be conducted during working hours to visually determine that storage vessels are not leaking. If a leak is detected, the contents will be transferred, using a hand pump, into a new vessel. The leak will be collected and contained using absorbents such as Oil-Dry, vermiculite, or sand, which are stored at the vulnerable areas in a conspicuously marked drum. This used material, too, will be containerized for disposal pending analysis. All inspections will be documented in the project logbook.

10.4 PERSONNEL TRAINING AND SPILL PREVENTION

All personnel will be instructed in the procedures for incipient spill prevention, containment, and collection of hazardous materials in the site-specific training. The FOL and the SSO will serve as the Spill Response Coordinators for this operation, should the need arise.

10.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT

The following represents the minimum equipment that may be maintained (depending on anticipated need) at the staging areas at all times for the purpose of supporting this Spill Prevention/Containment Program.

- Sand, clean fill, vermiculite, or other non combustible absorbent (Oil-dry)
- Drums (55-gallon U.S. DOT 17-E or 17-H)
- Shovels, rakes, and brooms
- Container labels

10.6 SPILL CONTROL PLAN

This section describes the procedures the TtNUS field crew members will employ upon the detection of a spill or leak.

1. Notify the SSO or FOL immediately upon detection of a leak or spill. Activate emergency alerting procedures for that area to remove all non-essential personnel.

2. Employ the personal protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point in the vessel. Spread the absorbent material in the area of the spill, covering it completely.

3. Transfer the material to a new vessel; collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment and disposal options.

4. Recontainerize spills, including 2-inch of top cover impacted by the spill. Await test results for treatment or disposal options.

It is not anticipated that a spill will occur that the field crew cannot handle. Should this occur, notification of the appropriate Emergency Response agencies will be carried out by the FOL or SSO in accordance with the procedures discussed in Section 2.0 of this HASP.

11.0 CONFINED-SPACE ENTRY

It is not anticipated, under the proposed scope of work, that confined space and permit-required confined space activities will be conducted. Therefore, personnel under the provisions of this HASP are not allowed, under any circumstances, to enter any confined spaces. A confined space is defined as an area which has one or more of the following characteristics:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.

A Permit-Required Confined Space is one that:

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material that has the potential to engulf an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section.
- Contains any other recognized, serious, safety or health hazard.

For further information on confined space, consult the Health and Safety Guidance Manual or call the PHSO. If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will have to be addressed.

12.0 MATERIALS AND DOCUMENTATION

The TtNUS FOL shall ensure the following materials/documents are taken to the project site and used when required.

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets
- Material Safety Data Sheets for all chemicals brought on site, including decon solution, fuels, sample preservations, calibration gases, etc.
- Follow-up Reports (to be completed by the FOL)
- A full size OSHA Job Safety and Health Poster
- Training/Medical Surveillance Documentation Form (blank)
- First-Aid Supply Usage Form
- Emergency Reference Form (Section 2.0, extra copy for posting)

12.1 MATERIALS TO BE POSTED AT THE SITE

The following documentation is to be posted at the site for quick reference purposes. In situations where posting these documents is not feasible, (such as no office trailer), these documents should be separated and immediately accessible.

Chemical Inventory Listing - This list represents all chemicals brought on site, including decontamination solutions, sample preservations, fuel, etc.. This list should be posted in a central area.

Material Safety Data Sheets (MSDS) - The MSDSs should also be in a central area accessible to all site personnel. These documents should match all the listings on the chemical inventory list for all substances employed on site. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

The OSHA Job Safety & Health Protection Poster - this poster, as directed by 29 CFR 1903.2 (a)(1), should be conspicuously posted in places where notices to employees are normally posted. Each FOL shall ensure that this poster is not defaces, altered, or covered by other material.

Site Clearance Posting - This list is found within the training section of the HASP (See Figure 8-2). This list identifies all site personnel, dates of training (including site-specific training), and medical surveillance. The lists indicates not only clearance but also status. If personnel do not meet these requirements, they do not enter the site while site personnel are engaged in activities.

Emergency Phone Numbers and Directions to the Hospital(s) - This list of numbers and directions will be maintained at all phone communications points and in each site vehicle.

Medical Data Sheets/Cards - Medical Data Sheets will be filled out by on site personnel and filed in a central location. The Medical Data Sheet will accompany any injury or illness requiring medical attention to the medical facility. a copy of this sheet or a wallet card will be given to all personnel to be carried on their person.

Hearing Conservation Standard (29 CFR 1910.95) - this standard will be posted anytime hearing protection or other noise abatement procedures are employed.

Personnel Monitoring - All results generated through personnel sampling (levels of airborne toxins, noise levels, etc.) will be posted to inform individuals of the results of that effort.

Placards and Labels - Where chemical inventories have been separated because of quantities and incompatibilities, these areas will be conspicuously marked using DOT placards and acceptable (Hazard Communication 29 CFR 1910.1200(f)) labels.

The purpose, as stated above, is to allow site personnel quick access to this information. Variations concerning location and methods of presentation are acceptable, providing the objection is accomplished.

13.0 GLOSSARY

ACGIH	American Conference of Governmental Industrial Hygienists
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action - Navy
CNS	Central Nervous System
CTO	Contract Task Order
CZR	Contamination Reduction Zone
DOD	United States Department of Defense
eV	electron Volts
FDOT	Florida Department of Transportation
FOL	Field Operations Leader
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSM	Health and Safety Manager
IDLH	Immediate Dangerous to Life or Health
IDW	Investigative-Derived Wastes
LEL/LFL	Lower Explosive Limit / Lower Flammable Limit
MSDA	Material Safety Data Sheets
N/A	Not Available
NAS	Naval Air Station
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicity Program
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PPE	Personal Protective Equipment
SAP	Sampling and Analyses Plan
SOPs	Standard Operating Procedures
SSO	Site Safety Officer
TBD	To be determined
TLV	Threshold Limit Value
TOM	Task Order Manager
TWA	Time-Weighted Average
WP	Work Plan

ATTACHMENT I

INJURY/ILLNESS PROCEDURE AND REPORT FORM

CASE NO. ________

TETRA TECH NUS, INC.

INJURY/ILLNESS PROCEDURE
WORKER'S COMPENSATION PROGRAM

WHAT YOU SHOULD DO IF YOU ARE INJURED OR DEVELOP AN ILLNESS AS A RESULT OF YOUR EMPLOYMENT:

- If injury is minor, obtain appropriate first aid treatment.
- If injury or illness is severe or life threatening, obtain professional medical treatment at the nearest hospital emergency room.
- If incident involves a chemical exposure on a project work site, follow instructions in the Health & Safety Plan.
- Immediately report any injury or illness to your supervisor or office manager. In addition, you must contact your Human Resources representative, Marilyn Diethorn at (412) 921-8475, and the Corporate Health and Safety Manager, Matt Soltis at (412) 921-8912 within 24 hours. You will be required to complete an Injury/Illness Report (attached). You may also be required to participate in a more detailed investigation from the Health Sciences Department.
- If further medical treatment is needed, The Hartford Network Referral Unit will furnish a list of network providers customized to the location of the injured employee. These providers are to be used for treatment of Worker's Compensation injuries subject to the laws of the state in which you work. Please call Marilyn Diethorn at (412) 921-8475 for the number of the Referral Unit.

ADDITIONAL QUESTIONS REGARDING WORKER'S COMPENSATION:

Contact your local human resources representative, corporate health and safety coordinator, or Corporate Administration in Pasadena, California, at (626) 351-4664.

Worker's compensation is a state-mandated program that provides medical and disability benefits to employees who become disabled due to job related injury or illness. Tetra Tech, Inc. and its subsidiaries (Tetra Tech or Company) pay premiums on behalf of their employees. The type of injuries or illnesses covered and the amount of benefits paid are regulated by the state worker's compensation boards and vary from state to state. Corporate Administration in Pasadena is responsible for administering the Company's worker's compensation program. The following is a general explanation of worker's compensation provided in the event that you become injured or develop an illness as a result of your employment with Tetra Tech or any of its subsidiaries. Please be aware that the term used for worker's compensation varies from state to state.

WHO IS COVERED:

All employees of Tetra Tech, whether they are on a full-time, part-time or temporary status, working in an office or in the field, are entitled to worker's compensation benefits. All employees must follow the above injury/illness reporting procedures. Consultants, independent contractors, and employees of subcontractors are <u>not</u> covered by Tetra Tech's Worker's Compensation plan.

WHAT IS COVERED:

If you are injured or develop an illness caused by your employment, worker's compensation benefits are available to you subject to the laws of the state you work in. Injuries do not have to be serious; even injuries treated by first aid practices are covered and must be reported. Please note that if you are working out-of-state and away from your home office, you are still eligible for worker's compensation benefits.

CASE NO. ________

TETRA TECH NUS, INC.
INJURY/ILLNESS PROCEDURE
WORKER'S COMPENSATION PROGRAM

To: Corporate Health and Safety Manager
Human Resource Administrator

Project Name: ______________________

Project No.______________________

Prepared by: ______________________

Position: ______________________

Office: ______________________

Telephone: ______________________

Information Regarding Injured or Ill Employee:

Name: ______________________

Home address: ______________________

____

Home telephone: ______________________

Occupation (regular job title): ______________________

Department: ______________________

Office: ______________________

Gender: M ☐ F ☐ No. of dependents: ______

Marital status: ______________________

Date of birth: ______________________

Social Security No.: ______________________

Date of Accident: ______________________ **Time of Accident:** ______________________

Location of Accident Was place of accident or exposure on employer's premises Yes ☐ No ☐

Street address: ______________________

City, state, and zip code: ______________________

County: ______________________

Narrative Description of How Accident Occurred: (Be specific. Explain what the employee was doing and how the accident occurred.)

TETRA TECH, INC.
INJURY/ILLNESS REPORT

Did employee die? Yes ☐ No ☐
Was employee performing regular job duties? Yes ☐ No ☐
Was safety equipment provided? Yes ☐ No ☐
Was safety equipment used? Yes ☐ No ☐
Note: Attach any police reports or related diagrams to this accident report.

Witness(es):
Name:
Address:
Telephone:

Describe the Illness or Injury and Part of Body Affected:

Name the Object or Substance which Directly Injured the Employee:

Medical Treatment Required:	**Lost Work Days:**
☐ No ☐ Yes ☐ First Aid Only	☐ No. of Lost Work Days ____________
Physician's Name: ____________	Last Date Worked ____________
Address: ____________	Time Employee Left Work ____________
Hospital or Office Name: ____________	Date Employee Returned to Work ____________
Address: ____________	☐ No. of Restricted Work Days ____________
____________	☐ None
Telephone No.: ____________	

Corrective Action(s) Taken by Unit Reporting the Accident:

Corrective Action Still to be Taken (by whom and when):

Name of Tetra Tech employee the injury or illness was first reported to: ______________________________

Date of Report: ____________________________ Time of Report: ____________________________

	Printed Name	Signature	Telephone No.	Date
Project or Office Manager				
Site Safety Coordinator				
Injured Employee				

To be completed by Human Resources:

Date of hire: Hire date in current job:

Wage information: $ _____________ per _________ (hour, day, week, or month)

Position at time of hire:

Shift hours:

State in which employee was hired:

Status: ☐ Full-time ☐ Part-time Hours per week: _________ Days per week: _______

Temporary job end date:

To be completed during report to workers' compensation insurance carrier:

Date reported: Reported by:

TeleClaim phone number:

TeleClaim account number:

Location code:

Confirmation number:

Name of contact:

Field office of claims adjuster:

ATTACHMENT II

TICK CONTROL
AND
LYME DISEASE

TICK CONTROL
AND
LYME DISEASE

The occurrence of Lyme disease has become a worldwide problem since its identification in 1976. This disease is characteristically recognized as being transmitted by ticks, which may be encountered by field personnel while working at this site. As a result, this discussion has been included with this Health and Safety Plan to provide for adequate recognition, evaluation, and control efforts to minimize the occurrence and effects of this potential hazard.

The discovery of Lyme disease is credited to Dr. Allen Steere of Yale University Medical School, and is named after the community where it was (reportedly) first encountered, Lyme, Connecticut. This disease can be transmitted to man through the bite of ticks that are infected with a cork screw-shaped microbe (spirochete). The spread of this disease has been so rapid that in 1984 it surpassed Rocky Mountain Spotted fever as the most common tick-borne disease in the United States. In this country, most of the incidents of this disease have been recorded in the Northeast, and the tick species most commonly attributed with its spread is the deer tick.

Recognition

This hazard potential exists primarily in the spring and summer months, as these are the seasons that tick populations and activity flourish. In fact, 90 percent of the reported cases have occurred from early June through September. Also, this concern exists primarily in heavily vegetated areas. Therefore, recognition of these factors can aid in the awareness and control of this threat.

To aid in the recognition and identification of these insects, an example illustration of the tick species common to the region where this site is located has been included with this discussion. This species (the American Dog tick) is common in the eastern half of the United States, and typically exists in areas covered with grass or underbrush. These insects will attach themselves to animals (including man) that pass through the area and rub against them. After finding a host, the tick inserts its mouthparts and sucks blood until it is fully engorged. This requires a time period of three to twelve days, then the tick will drop off. In addition to Lyme disease concerns, this tick has also been identified as a transmitter of Rocky Mountain Spotted Fever, and the organisms of tularemia and possibly relapsing fever. The wounds left by tick bites can be painful, and can also have a paralyzing effect commonly referred to as tick paralysis.

The earliest symptom of the onset of this disease is the occurrence of an unusual red skin rash. This is commonly the first indication since it has been evidenced that many persons who have contracted this disease were, in fact, unaware that they had been bitten. This rash can appear at the site of the bite anywhere from several days to a few weeks after the bite. It typically starts as a small red spot, and then expands as the spirochetes expand from the bite location. Rash sizes can vary, but have been most commonly associated in a 2 to 3 inch diameter size range. This rash will fade (with or without treatment) after a few weeks. Close inspection is necessary to detect this symptom as the rashes are easy to miss because they're often very faint. Body sites where rashes frequently occur include the thigh areas, groin, and armpits. Also, it is not uncommon for a rash to develop in more than one place.

Other early symptoms include profound fatigue, a stiff neck, and flu-like symptoms such as headache, chills, fever, and muscle aches. Recognition of the onset of any of these symptoms is important since tick bites do not always produce a rash. If left untreated, the disease will progress to its second stage within weeks or months after the infection. This stage involves affects to the heart and nervous system. A common second stage symptom is a paralysis on one or both sides of the face. Others include severe headache, encephalitis, or meningitis. The third and final stage involves the development of chronic inflammatory arthritis, which can occur up to a year or more after the bite.

Evaluation

Evaluation of this hazard potential principally involves field personnel performing close self-inspections for the presence of ticks each time they leave the site. This should involve careful examination, especially of the individuals' heads. Personnel should be aware that when a tick attaches itself to its host, it inserts its entire head under the surface of the skin.

Control

Control of this threat involves several components. First, field personnel must be aware of the climate and area conditions which are commonly associated with being conducive to tick infestation. Second, when working in or walking through potential infested areas, personnel must ensure that they do not have exposed body parts (i.e. at least long sleeved shirts and long pants, particularly when protective coveralls are not worn). In heavily vegetated areas where infestation is likely, Tyvek coveralls will be required to minimize this hazard potential. Also, several commercial products have been demonstrated as being effective in repelling ticks. Examples include Permanone, Off!, and Cutter. These types of repellents will be used at the direction and discretion of the Tetra Tech NUS Health and Safety Officer, and only in accordance and observation of manufacturer's recommendations. In most instances, however, such repellents are typically applied to the outside surfaces of clothing (and not directly onto the skin), and should be applied also to shoe tops, socks, pants cuffs, and other areas most susceptible to ticks.

Tick Removal

In the event that a tick is discovered to be attached to a member of the field team, timely removal of the insect is critical to reducing the potential for contracting the disease. According to available information and research, there is apparently a grace period of at least a few hours from the time of the bite before the tick transmits the microbe (the spirochetes are not present in the mouth parts of the tick). However, the incident of a tick bite is frequently unnoticed, and the discovery of the tick may not occur until after this suspected grace period has already elapsed. Therefore, timely removal is very important. The preferred method of tick removal is to pull it out using tweezers or small forceps. In this method, the tick should be grasped as close to the mouth as possible, and then pulled steadily upward. Care must be exercised so as not to pull in a jerking motion as this can result in the head becoming detached. After the tick has been removed, disinfect the bite with rubbing alcohol or povidone iodine (Betadine). The tick must not be handled as the microbes can enter the body through any breaks in intact skin. The bite should be checked occasionally for at least a two-week period to see if a rash forms. If it does, medical attention must be promptly sought.

In order to provide for proper and timely response to the occurrence of a tick bite, the SSO will ensure that the site First Aid kit is properly equipped with medical forceps and rubbing alcohol, in addition to the standard kit contents. Also, an adequate supply of commercial insect (tick) repellents will be maintained on-site, and all personnel will be trained in its proper application and will be required to use it, at the direction of FOL.

ATTACHMENT III

EQUIPMENT INSPECTION CHECKLIST

EQUIPMENT INSPECTION

COMPANY:____ **UNIT NO.**________________

FREQUENCY: Inspect daily, document prior to use and as repairs are needed.

Inspection Date: ____/____/____ Time: _______ Equipment Type:________________________
(e.g., bulldozer)

	Good	Need Repair	N/A
Tires or tracks	❐	❐	❐
Hoses and belts	❐	❐	❐
Cab, mirrors, safety glass	❐	❐	❐
- Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?	❐	❐	❐
- Is the equipment equipped with audible back-up alarms and back-up lights?	❐	❐	❐
Horn and gauges	❐	❐	❐
Brake condition (dynamic, park, etc.)	❐	❐	❐
Fire extinguisher (Type/Rating -___________)	❐	❐	❐
Fluid Levels:			
- Engine oil	❐	❐	❐
- Transmission fluid	❐	❐	❐
- Brake fluid	❐	❐	❐
- Cooling system fluid	❐	❐	❐
- Windshield wipers	❐	❐	❐
- Hydraulic oil	❐	❐	❐
Oil leak/lube	❐	❐	❐
Coupling devices and connectors	❐	❐	❐
Exhaust system	❐	❐	❐
Blade/boom/ripper condition	❐	❐	❐
Accessways: Frame, hand holds, ladders, walkways (non-slip surfaces), guardrails?	❐	❐	❐
Power cable and/or hoist cable	❐	❐	❐
Steering (standard and emergency)	❐	❐	❐

Safety Guards:	**Yes**	**No**
– Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact?______________________________	❐	❐
– Hot pipes and surfaces exposed to accidental contact?______________________________	❐	❐
– All emergency shut offs have been identified and communicated to the field crew?__________	❐	❐
– Have emergency shutoffs been field tested? ______________________________	❐	❐
– Results?______________________________	❐	❐
– Are any structural members bent, rusted, or otherwise show signs of damage?__________	❐	❐
– Are fueling cans used with this equipment approved type safety cans?__________	❐	❐

- Have the attachments designed for use (as per manufacturer's recommendation) with this equipment been inspected and are considered suitable for use?________ ❐ ❐

Portable Power Tools:

- Tools and Equipment in Safe Condition?________ ❐ ❐
- Saw blades, grinding wheels free from recognizable defects (grinding wheels have been sounded)?________ ❐ ❐
- Portable electric tools properly grounded?________ ❐ ❐
- Damage to electrical power cords?________ ❐ ❐
- Blade guards in place?________ ❐ ❐
- Components adjusted as per manufacturers recommendation?________ ❐ ❐

Cleanliness:

- Overall condition (is the decontamination performed prior to arrival on-site considered acceptable)?________
- Where was this equipment used prior to its arrival on site?________
- Site Contaminants of concern at the previous site?________
- Inside debris (coffee cups, soda cans, tools and equipment) blocking free access to foot controls?________

Operator Qualifications (as applicable for all heavy equipment):

- Does the operator have proper licensing where applicable, (e.g., CDL)?________
- Does the operator, understand the equipments operating instructions?________
- Is the operator experienced with this equipment? ________
- Does the operator have emotional and/or physical limitations which would prevent him/her from performing this task in a safe manner?________
- Is the operator 21 years of age or more?________

Identification:

- Is a tagging system available, for positive identification, for tools removed from service?___

Additional Inspection Required Prior to Use On-Site

	Yes	No
– Does equipment emit noise levels above 90 decibels?	❐	❐
– If so, has an 8-hour noise dosimetry test been performed?	❐	❐

- Results of noise dosimetry:________
- Defects and repairs needed:________
- General Safety Condition: ________
- Operator or mechanic signature:________

Approved for Use: ❐ Yes ❐ No

____
Site Safety Officer Signature

ATTACHMENT IV

SAFE WORK PERMITS

SAFE WORK PERMIT FOR
SOIL BORINGS AND WELL INSTALLATION

Permit No. ______________ Date: __________________ Time: From ____________ to _____________

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): **Soil borings using Direct Push Technology (i.e., Geoprobe) technique. Monitoring well installation is included in this task.**

II. Required Monitoring Instruments: FID or PID

III. Field Crew: ____________________

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector ____________ ____________
TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

IV. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Detailed on Reverse

Respiratory equipment required
Full face APR ☐ Escape Pack ☐
Half face APR ☐ SCBA ☐
SKA-PAC SAR ☐ Bottle Trailer ☐
Skid Rig ☐ None ☒

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, safety glasses, hardhat, hearing protection, and nitrile gloves or leather gloves with surgical-style inner gloves.

V.

Chemicals of Concern	Action Level(s)	Response Measures
Potential site contaminants include VOCs and SVOCs from petroleum compounds	Any sustained readings above background in worker breathing zones.	Suspend site activities and retreat to an unaffected area.

VI. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes	☐ No
Safety Glasses	☒ Yes	☐ No
Chemical/splash goggles	☐ Yes	☒ No
Splash Shield	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No
Hearing Protection (Plugs/Muffs)	☒ Yes	☐ No
Safety belt/harness	☐ Yes	☒ No
Radio	☐ Yes	☒ No
Barricades	☐ Yes	☒ No
Gloves (Type ______)	☐ Yes	☐ No
Work/rest regimen	☐ Yes	☒ No

Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall and impermeable boots if there is a potential for soiling work clothes.

VII.

Procedure review with permit acceptors	Yes	NA
Safety shower/eyewash (Location & Use)	☐	☐
Procedure for safe job completion	☐	☐
Contractor tools/equipment/PPE inspected	☐	☐
Emergency alarms	☐	☐
Evacuation routes	☐	☐
Assembly points	☐	☐

VIII.

Equipment Preparation	Yes	NA
Equipment drained/depressurized	☐	☐
Equipment purged/cleaned	☐	☐
Isolation checklist completed	☐	☐
Electrical lockout required/field switch tested	☐	☐
Blinds/misalignments/blocks & bleeds in place	☐	☐
Hazardous materials on walls/behind liners considered	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☐ Yes ☐ No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

X. Special instructions, precautions: Minimize generation of airborne dusts.

Permit Issued by: ______________________ Permit Accepted by: ______________________

SAFE WORK PERMIT FOR MULTI-MEDIA SAMPLING

Permit No. ______________ Date: ____________________ Time: From ____________ to ______________

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): **Multi-media sampling including groundwater, soil, and IDW sampling.**

II. Required Monitoring Instrument(s): PID or FID

III. Field Crew: ______________________________

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector ____________ TtNUS ____________

SECTION II: General Safety Requirements (To be filled in by permit issuer)

IV. Protective equipment required

- Level D ☒ Level B ☐
- Level C ☐ Level A ☐
- Detailed on Reverse

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
SKA-PAC SAR	☐	Bottle Trailer	☐
Skid Rig	☐	None	☒

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, surgical style gloves, and safety glasses. Hard hats and hearing protection will be worn when working near operating equipment or when required by the SSO.

V.

Chemicals of Concern	Action Level(s)	Response Measures
Site contaminants include VOCs and SVOCs from petroleum compounds	Any sustained readings above background in worker breathing zones.	Suspend site activities and retreat to an unaffected area.

VI. Additional Safety Equipment/Procedures

	Yes	No		Yes	No
Hard-hat	☐	☐	Hearing Protection (Plugs/Muffs)	☐	☐
Safety Glasses	☐	☒	Safety belt/harness	☐	☒
Chemical/splash goggles	☐	☒	Radio	☐	☒
Splash Shield	☐	☒	Barricades	☐	☒
Splash suits/coveralls...........	☐	☐	Gloves (Type - Nitrile)	☒	☐
Steel toe Work shoes or boots	☒	☐	Work/rest regimen	☐	☒

Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall if there is a potential for soiling work cloths. SSO may dictate double-layering gloves.

VII. Procedure review with permit acceptors

	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)..........	☐	☐	Emergency alarms..................	☐	☐
Procedure for safe job completion.....................	☐	☐	Evacuation routes....................	☐	☐
Contractor tools/equipment/PPE inspected........	☐	☐	Assembly points	☐	☐

VIII. Equipment Preparation

	Yes	NA
Equipment drained/depressurized	☐	☐
Equipment purged/cleaned	☐	☐
Isolation checklist completed	☐	☐
Electrical lockout required/field switch tested..	☐	☐
Blinds/misalignments/blocks & bleeds in place..	☐	☐
Hazardous materials on walls/behind liners considered	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.)..................... ☐ Yes ☐ No

If yes, complete permit required or contact Health Sciences, Pittsburgh Office

X. Special instructions, precautions: . ______________________________

Permit Issued by: ______________________________ Permit Accepted by: ______________________

ATTACHMENT V

HEAT STRESS

HEAT STRESS

Because some physically demanding field work is expected to take place during warmer months or periods, heat related disorders are a potential problem. Discussed below are the common heat-related disorders and the recommended actions to prevent heat stress.

Heat Related Disorders

Heat Rash

Also known as prickly heat, this condition affects the skin. It occurs in situations where the skin remains wet most of the time. The sweat ducts become plugged and a skin rash soon appears.

Signs and Symptoms

- Skin rash will appear on affected areas of the body.
- Tingling or prickling sensation will be felt on the affected areas.

Heat Cramps

Heat cramps are muscle pains, usually in the lower extremities, the abdomen, or both, that occur after profuse sweating with accompanying salt depletion. Heat cramps most often afflict people in good physical condition, who overwork in conditions of high temperature and humidity. Untreated, heat cramps may progress to heat exhaustion.

Signs and Symptoms

- Cramps in the extremities and abdomen that begin suddenly during vigorous activity. Heat cramps can be mild with only slight abdominal cramping and tingling in the extremities, but more commonly present intense and incapacitating pain in the abdomen and extremities.
- Respiration rate will increase, decreasing after the pain subsides.
- Pulse rate will increase
- Skin will be pale and moist.
- Body temperature will be normal
- Generalized weakness will be noted as the pain subsides.
- Loss of consciousness and airway maintenance are seldom problems with this condition.

Treatment for heat cramps is aimed at eliminating the exposure and restoring the loss of salt and water.

Heat Exhaustion

Heat exhaustion is a more severe response to salt and water loss, as well as an initial disturbance in the body's heat-regulations system. Like heat cramps, heat exhaustion tends to occur in people working in hot environments. Heat exhaustion may progress to heat stroke. Treatment for heat exhaustion is similar in principle to that for heat cramps.

Signs and Symptoms

- Heat exhaustion may be accompanied present by a headache, fatigue, dizziness, or nausea with occasional abdominal cramping. More severe cases of heat exhaustion may resulting partial or complete temporary loss of respiration nd circulation due to cerebral ischemia.

- Sweating will be profuse.

- Pulse rate will be rapid and weak.

- Respiration rate will be rapid and shallow.

- The skin will be pale and clammy

- The body temperature will be normal or decreased.

- The person could be irritable and restless.

Heat Stroke

Heat stroke is caused by a severe disturbance in the body's heat-regulating system and is a profound emergency: The mortality rate ranges from 25 to 50 percent. It is most common in men over 40, especially alcoholics. It can also occur to people of any age having too much exposure to the sun or prolonged confinement in a hot atmosphere. Heat stroke comes on suddenly. As the sweating mechanism fails, the body temperature begins to rise precipitously, reaching 106°F (41°C) or higher within 10 to 15 minutes. If the situation is not corrected rapidly, the body cells -- especially have very vulnerable cells to the brain--are literally cooked, and the central nervous system is irreversibly damaged. The treatment for heat stroke is aimed at maintaining vital functions and causing as rapid a decrease of body temperature as possible.

Signs and Symptoms

- The person's pulse will be strong and bounding.
- The skin will be hot, dry, and flushed.
- The worker may experience headache, dizziness, and dryness of mouth
- Seizures and coma can occur.
- Loss of consciousness and airway maintenance problems can occur.

These are only guidelines for heat related emergencies. Actual training in emergency medical care or basic first aid is recommended.

Controlling Heat Stress

The SSO shall visually monitor personnel to note for signs of heat stress. Field personnel will also be instructed to observe for symptoms of heat stress and methods on how to control it. One or more of the following control measures can be used to help control heat stress:

- Provide adequate liquids to replace lost body fluids. Personnel must replace water and salt lost from sweating. Personnel must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.

- Replacement fluids can be commercial mixes such as Gatorade®.

- Establish a work regime that will provide adequate rest periods for cooling down. This may require additional shifts of workers.

- Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.

- Breaks are to be taken in a cool rest area (77°F is best).

- Personnel shall remove impermeable protective garments during rest periods.

- Personnel shall not be assigned other tasks during rest periods.

- Personnel shall be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

The heat stress of personnel onsite may be monitored utilizing biological monitoring.

One of the following biological monitoring procedures may be utilized by the SSO to monitor heat stress concerns.

- Heart rate (HR) shall be measured by the pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 10 minutes (or 33 percent), while the length of rest period stays the same. If the pulse rate is 100 beats/minute at the beginning of the next rest period, the following work cycle should be shortened by 33 percent. The length of the initial work period will be determined by using the table below.

PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUES

	Work Load		
Work-Rest Regimen	Light	Moderate	Heavy
Continuous	80.0°F	80.0°F	77.0°F
75% Work - 25% Rest, Each Hour	87.0°F	82.4°F	78.6°F
50% Work - 50% Rest, Each Hour	88.5°F	85.0°F	82.2°F
25% Work - 75% Rest, Each Hour	90.0°F	88.0°F	86.0°F

- Body temperature shall be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period should not exceed 99°F. If it does, the next work period should be shortened by 10 minutes (or 33 percent), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.7°F at the beginning of the next rest period, the following work cycle shall be further shortened by 33 percent. OT should be measured at the end of the rest period to make sure that it has dropped below 99°F. At no time shall work begin with the oral temperature above 99°F.

NOTE: External temperatures in excess of those stated above shall be regarded as inclement weather. Work continuation, termination, or alteration of the work schedule will be at the discretion of the FOL or SSO.